The
Electrical Review

VOL. CXXI JULY 16, 1937. No. 3111

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY. Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, SEDIST, LONDON." Code, A B C. Telephone No.: Waterloo 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

Classified Advertisements—Official Notices—Tenders—Supp. 13.

Index to Advertisers—Page xl.

Principal Contents:

	PAGE
Technical Distribution	73
Rural Electrification in Essex	75
Electrical Engineers from Overseas	77
Pulverised Fuel. By Vernon EWalker	78
Artistic Lighting. By J. B. Harris	79
The Electric Knife in Surgery. By E. H. Turle	81
Traction Equipment Production	83
Army Vocational Training	84
Electrification of Agriculture. By F. E. Rowland	85
A Change-over at a Brewery	85
A Census of Domestic Apparatus. By Commercial Assistant	86
Parliamentary News	87
New Apparatus and Devices	88
Correspondence: Registration and Inspection	89
Business and Industrial Notes	90
Electricity Supply	94
Traction and Communications	96
Contract Information	97
Notes	97
Our Personal Column	99
Financial Section	100
Published Specifications	103
New Work for Contractors	104

Technical Distribution

AMONG the provisions included in the Government's outline of proposals for securing the reorganisation of distribution is one requiring that a scheme of amalgamation shall improve technical operation or produce economies, which would be passed on to the consumers in the form of reduced prices.

There is a not unnatural tendency to regard the reorganisation of distribution as analogous to the co-ordination of generation and to expect results similar to those accruing from the construction of the national grid—though not, we trust, on so extravagant a scale as those talked about during the passing of the 1926 Act.

The analogy, however, would be a false one. The construction of the grid was primarily an engineering matter (however hedged about with contentious points it may have been), and only carried further a tendency towards inter-connection of stations and the furnishing of bulk supplies that already existed. Disagreement was generally with the method of forcibly speeding up this tendency by Act of Parliament.

On the other hand, the purely engineering principles of distribution would hardly be affected by legislation of the type envisaged. A linking up of local networks is not suggested, and any comparison between the elimination of less efficient stations and of smaller undertakings is invalid, since cable systems would not, of course, be closed down or superseded.

It is proposed to reduce the number of supply areas to a far lower figure than that represented by the number of selected stations, but technically there is not the virtue in size in the one case that there is in the other. There is, or should be, little difference in the capacities of distribution cables or transformers whatever the size of area; these depend mainly upon the nature and density of the load in unit sub-areas, and a large undertaking comprises more of these than do small ones.

A larger undertaking will usually have a greater diversity factor on its main feeding points, but this is less important, as regards the distributors, than are the diversities of demand in each unit sub-area. Indeed, there may be said to be an optimum size of distribution area depending on local circumstances.

The ownership of power stations, being vested in the undertaking themselves, leaves room for healthy differences in practice in the selection from numerous improvements in technique when installing new plant, since design is not yet by any means stereotyped. A similar latitude for the play of divergent informed opinions would not appear to be allowed for in the distribution proposals. While there are, it is true, far too many instances of unnecessary variations, *e.g.*, in voltages, cable sizes and individual requirements for transformers and accessories, there are still more in which unification of practice would hamper progress, *e.g.*, those in which the conditions are not yet ripe for British Standard Specifications.

Economy in fuel and a reduction in the margin of spare plant has followed the grouping of stations, and generation efficiency is reflected closely enough in thermal efficiency, but equivalent economies and a parallel method of comparing performance are not to be found in distribution.

The technical aspect of distribution is, of course, only one—and it would appear a minor one—of the official proposals. Nevertheless, when considering its relationship to the administrative and financial questions that would provide the principal features of any Bill introduced, it is important to bear in mind that economical expenditure is not necessarily that which brings immediate returns. Real economy is to be achieved only by planning networks well in advance of the load that can reasonbly be anticipated if the aims of the proposals are kept in view, even if the methods devised for achieving them do not meet with universal approval.

Growth of Output

THE first half of this year ended on a high note from the point of view of electricity generated, the June output being up by 18.1 per cent. For the whole period the rate of increase—13.4 per cent.—appears to be moderate by comparison with the 16.3 per cent. for the first six months of last year. The position is, however, more satisfactory than the figures indicate. As 1936 was a Leap Year, February contained an extra day, which, on the basis of the daily average, would account for about 63 million kWh, and the expansion was 23.4 per cent. against 6.6 per cent. in the corresponding month of the current year. Further, the lower rate of increase in May (11.3 per cent.) shows that the Coronation illuminations, extensive as they were, did not compensate for the closing down of works. Allowing for these points, the general trend may be regarded as favourable. This is borne out by the figures for March, April and June, which show increases of 18.3, 17.9 and 18.1 per cent.—all well above the average for the first six months of 1936.

Is this Progress?

A DECISION that trolley-buses should be supplanted by Diesel buses was reached by the Chesterfield Town Council last week, the chairman of the Transport Committee observing that they could sympathise with the possible loss of livelihood which might accrue to miners, but there was a price they had to pay all along the line for progress. From the facts placed before the meeting the term "progress" is hardly justified. It was divulged that in ten years the trolley-bus system had cleared off a total debt of £72,343, including £23,415 transport debt, £11,876 for road renewals and £37,052 for the installation of the system, the current year starting debt free. But it seems that, while in six years the trolley-buses would make a profit of £6,381, Diesel buses would yield £10,536. It is important to note, though, that no provision is made for any possible increase in the price of Diesel oil, which cannot be considered unlikely, while the price of electricity, despite adverse factors, continues to fall in many areas.

Safety in Mines

A DRAFT of the revisions in the Mining Regulations proposed as a result of the Gresford explosion, has been sent to the principal representative bodies of the mining industry for discussion. These refer only to such matters as are unlikely to prejudice the recommendations of the Royal Commission on Safety in Coal Mines. The proportion of combustible matter in coal dust is related to the volatile content in the seam, and standards of incombustible dust are modified. Several paragraphs are allocated to fire fighting. For gas inspection in mines of any size, both electric and flame safety lamps (which may be combined), must be carried. Otherwise, the only electrical section which it has been found necessary to modify is that relating to apparatus for signalling and communications, which must be of a type approved by the Board of Trade when used in safety-lamp areas. The reason for this is that, while electrical ignition of fire damp is the cause of only a small percentage of the accidents attributed to electricity (which themselves form only 0.027 per cent. of the total from all sources), it is responsible for a greater number of fatalities than is shock.

A Useful Manual

WE review in this issue a "Manual of Electric Heating Devices and Applications," sent to us by Mr. G. G. Jobbins, engineer and manager to the Victoria Electricity Commission. This well-produced and informative brochure is designed for the education of the consumer, but really it seems too good for the purpose. In the first place it covers too wide a field and digs too deeply at times. The householder wishing to warm his rooms, heat his water and cook electrically will not want to go quite so far into the science of the subject, nor will he be interested in the industrial applications which are covered by the book. On the other hand, the industrialist will think the domestic matter superfluous. Nevertheless, it is better to go too far than not far enough, and as there is something in the manual for all interested parties it is to be commended. We think, however, that it will be of much greater assistance to the consumer's engineer and canvasser, who will have at their service, in a convenient form, all the principal arguments in favour of electric heating, which they can select and elaborate at their discretion to suit the prospective consumer of the moment.

Coal Prices and Quality

IT would be thought that Sheffield was favourably situated as regards its coal supplies and that suitable qualities at reasonable prices would be easily obtainable. Apparently the City Electricity Department is as badly treated as those of some less favourably placed towns, and both price and quality are not what they should be. In an effort to have the situation remedied the Sheffield City Council is putting the matter before the District Committee of Investigation set up under the Coal Mines Act of 1920, and it is to be hoped that satisfaction will be obtained. The matter is one of more than purely local interest. Undertakings in all parts of the country are complaining of the leap in coal prices, which seems to be much greater than circumstances warrant. This must militate against the further reduction of electricity charges, which is one of the principal aims of the reorganisation proposals.

Still Lower Tariffs

PLANT prices have risen. So has the cost of coal. Yet electricity supply undertakings in various parts of the country are still reducing their charges. Last week the Manchester City Council decided to sanction substantial tariff reductions in its large area, although the Department has had to face the loss of the 12 million kWh bulk supply to Stretford in addition to the other adverse factors. Much smaller but not less enterprising, the Sale undertaking, which was last year involved in expensive litigation over the purchase of part of the system of the Altrincham Electric Supply Co., is also able to cut its charges. Barking has reduced its lighting rate to 3d. and made other modifications. Ilford is now offering three kWh a penny under its domestic tariff during the summer. The North-Eastern Electric Supply Co. recently announced concessions. These are a few of many examples which could be quoted. Such reductions do something to mitigate the general rise in costs industrially and must be doubly welcome to domestic consumers who have no means of passing on their increasing expenses.

Ancient and Modern

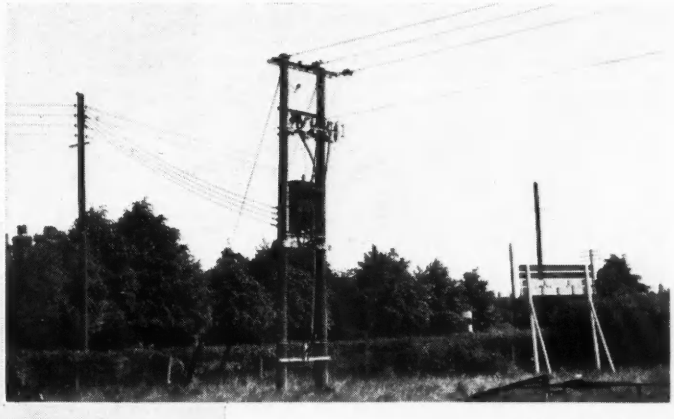
LAST April two coaches of a train were derailed at Crewe owing to the breakage of an axle of one of them—a kitchen wagon. The official inquiry has indicated the cause as a fatigue flaw in a position where it could not be discovered by routine examination or by a magnetic detector. The initial cause was almost certainly corrosion, a subject which has for some time been investigated by the L.M.S. Co.'s research department with a view to finding a protective composition, presumably on the lines of that reported by us recently in referring to the work of the National Physical Laboratory. That is all very much in accord with the practice of 1937—not so the revelation that on the kitchen wagon gas was used for both lighting and cooking. Although the gas pipes broke and all the gas escaped, there was fortunately no fire. This contrast between obsolete and modern practice is heightened by its occurrence on the system of a railway company that has several electric propulsion schemes to its credit.

Rural Electrification in Essex

Recent developments by the County Company

SEVEN years ago, apart from the few local supplies in such towns as Maldon and Saffron Walden, public electricity supply in the rural districts of Essex was practically non-existent. Since the County of London Electric Supply Company's Act of 1927 came into operation the company has connected, in the 613 sq. miles covered by the Act, approximately 20,000 consumers with a total load of about 40,000 kW, very largely domestic or agricultural, but also including a number of useful industrial loads of a very varied character.

The area in question represents rather less than a half of the county, and extends from Saffron Walden to Rayleigh and from the edge of Brentwood to Burnham-on-Crouch. Up to the present about 237 miles of 11-kV and 307 miles of 400/230-V lines, practically all overhead, have been provided to serve the two hundred or so towns and villages now receiving electricity, but these figures are continually growing. Many miles will, in fact, be added by extensions now in hand in the Mayland, Bardfield, Stebbing, the Easters, Rosewell, Pleshey, Paglesham and Asheldham areas, all of which will have supplies by the end of the year.



[*Elec. Rev. photos*

Above: A 25-kVA feeding point at Bicknacre, and (left) a 25-kVA pole transformer supplying the poultry farm of Sterling Poultry Products at Felsted

Although brick-built sub-stations are employed in the towns and larger villages, the scattered nature of the premises supplied has resulted in the very extensive use of pole-mounted transformers. Altogether the number of transforming points, including sub-stations, pole transformers, and kiosks is at present 269.

The character of the load connected covers all classes of usage usually to be found in rural districts, but the domestic side naturally figures rather prominently in such an area as this. Assisted wiring schemes have been responsible for the connection of 3,028 consumers, and the introduction of hire and hire-purchase systems, as well as an all-in tariff, have ensured that the supplies are not generally taken for lighting alone, though the recent reduction of the lighting flat rate from 8d. to 6d. per kWh should bring many new consumers on to the mains. The two-part tariff slot meter is proving popular, as the consumer has the option of choosing from the various rates that apply. A large percentage adopt the all-in rate with its fixed quarterly charge based on floor area and a "unit" charge of 1d.

A special charge of ¾d. per kWh for domestic water heating has resulted in a strong demand for heaters of the immersion type, used in conjunction with the existing system, either as an alternative source of heat or as boosters. The 1½-gallon storage-type heater is also finding favour, particularly for the kitchen or where a large volume of water is not required.

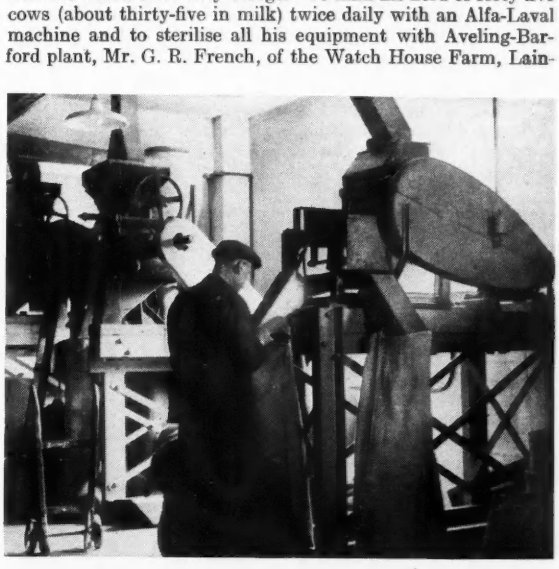
Orders are coming in fast for refrigerators which are available on hire-purchase at from 2s. 6d. a week, and a large number of washing machines has also been installed. Electric cookers and utensils can be obtained on hire-purchase terms, including full maintenance. The heating and cooking flat rate is 2d. per kWh.

Development, particularly on the domestic side, is being considerably simplified and accelerated by the contacts created with the consumers at the company's five showrooms at Chelmsford, Wickford, Maldon, Saffron Walden and Dunmow. Though not elaborate they are well planned and equipped to give any demonstration, service or advice required of them, and their window displays are constantly being changed to keep them up to date.

To reach outlying consumers or prospective consumers the company also has two travelling showrooms. The larger, capable of seating thirty persons comfortably, is sent around the countryside, usually stopping at one spot for about a fortnight, but sometimes as much as a month. All types of apparatus applicable to domestic and agricultural uses are represented inside. A much smaller affair, attached to the Saffron Walden showroom, is in the form of a trailer, which can be hauled by quite a small car. It has three compartments on each side displaying types of appliances particularly suitable for the neighbourhood it is visiting.

It must not be thought that domestic electrification is the company's only iron in the fire. After a three-hundred-mile tour with Mr. J. L. Rogers, the company's development officer for the area, to see just a few of the other purposes for which electricity is supplied, our principal impression was that, no matter what the industry, large or small, electricity can assist it to be more easily and more profitably run. The coming of electricity has, in fact, helped many a concern to "turn the corner," and, moreover, it has been responsible for the establishment of new industries in localities and under conditions previously considered totally unsuitable.

In particular, all the farmers we spoke to—there are something like 150 taking supplies—were enthusiastic about the benefits which electricity brings. To milk his herd of forty-five cows (about thirty-five in milk) twice daily with an Alfa-Laval machine and to sterilise all his equipment with Aveling-Barford plant, Mr. G. R. French, of the Watch House Farm, Lain-



[*Elec. Rev. photo*

Wheat cutter, kibbler and oat-crusher at Hasler's Mills

don, has in ninety-eight days used only 127 kWh of electricity, which at 1d. per kWh represents a cost of less than three-halfpence a day. Similar good reports come from the Hallingbury Park Farm, owned by Captain Griffiths, where, besides an Alfa-Laval milker, there are a Bentall oat crushing machine, a

"Hallmark" refrigerator, and the latest addition, a Perkins bottle washer. All the water required for the farm with its herd of nearly a hundred is supplied by a ½-h.p. Lister electric pump.

Poultry farmers, too, are finding electricity indispensable in these days of competition. Over a million day-old chicks are supplied annually by the Sterling Poultry Products, Felsted, who use electricity for both heating and ventilation in their twelve 16,000-egg "Buckeye" incubators. Incidentally, this concern has just found it worth while to take electricity from the supply company instead of relying on its home-made supplies, from duplicate oil engines.

On his farm an Sandon Capt. L. L. Ogier has usually somewhere between 12,000 and 20,000 birds, largely for table use. His electrical equipment includes one 9,000-egg "Robbins Mammoth" and one 6,000-egg "Primulo" incubators, egg testers, graders and washers, and a "Comb" plucking machine capable of dealing with 30-35 birds an hour. For storing the birds ready for market Capt. Ogier has built himself a cold room with a 4-in. cork lining over the ceiling and walls, electric fans drawing in the air from outside through damp screens. In a factory adjoining this farm Mr. G. Chalk, who specialises in the manufacture of poultry farming equipment, drives all his machinery by electricity and also has an electric paint and creosote spraying plant.

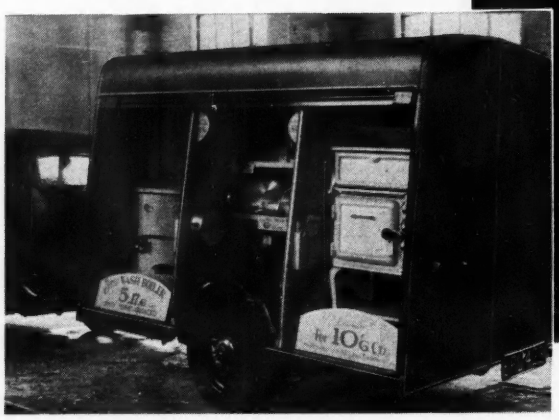
Market gardening does not mean to be behind the times and here again the use of electricity is becoming widespread. To be able to supply apples in good condition all the year round elaborate storage precautions are necessary, correct temperature and adequate ventilation being essential. At one of the largest firms in the county, Mr. D. Lambert's Manor Fruit Farm, Danbury, these requirements are provided by means of two 25-ton "Hallmark" cold rooms. Here also electric fruit spraying is employed, a central plant (W. Weeks & Sons, Ltd.), serving the whole of the orchards comprising the farm.

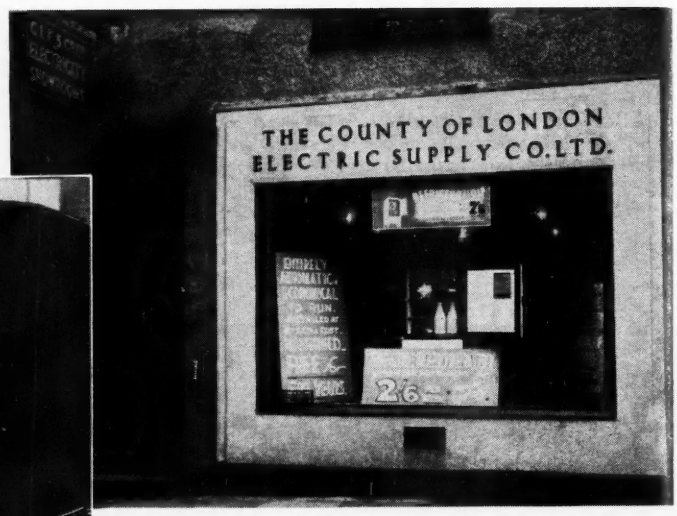
Flower growers benefit from the use of electricity in a different way. Soil heating is proving its worth, and experiments are now being carried out by C. Englemann, Ltd., at Saffron Walden, on the effect of electric lighting on the production of carnations, antirrhinums, pansies, and various other plants.

Conveying, cutting, crushing, grinding, mixing and weighing are only a few of the operations carried out electrically at Hasler's Mills, Dunmow, one of the best known suppliers of cattle and poultry foods in the country, and we were particularly impressed by the neatness and space saving made possible by these modern methods. Cleanliness, too, is another important consideration in an industry such as this and here, again, electricity scores heavily.

We have been able to mention briefly but a few of the agricultural concerns so far taking advantage of electricity. Furthermore, we could fill this journal with a description of its other industrial applications in the area for such places as saw mills and factories for the production of newsprint, oil, flex, clothing, cement, beet sugar, waste fat, dartboards, bacon and sausages. At one of the works which we visited, the Mildmay Ironworks of Booth & Brooks, Burnham-on-Crouch, the change-over from local generation to public supply is providing much needed extra space for the production of the firm's specialities, piano frames, sewing machines, mincing machine parts, and other medium sized castings. Apart from a power load of about 120 h.p. the heating of the stoving ovens accounts for 66 kW.

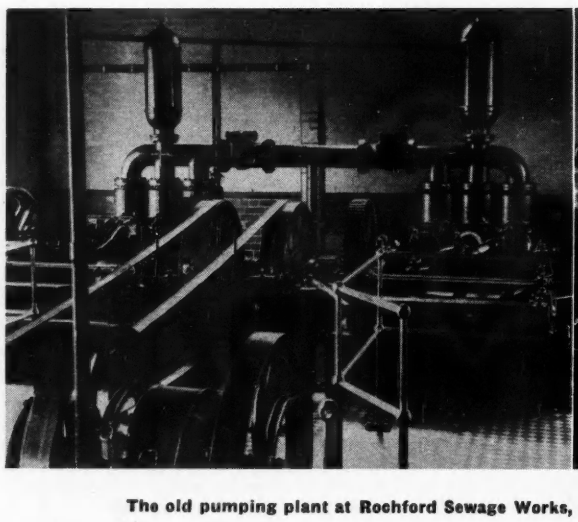
The advent of electricity has also been reflected in an improvement of the public services. Electric street lighting is spreading rapidly and authorities are becoming quick to appreciate the advantages of electric pumping for water and sewage work. Many of the smaller villages, such as Hatfield Broad Oak, would, in fact, still be without main water supplies but for their small electrically operated local pumping sets. In the larger pumping stations, the Rochford sewage works for instance, the mains-driven plant is being found more convenient, compact and reliable.

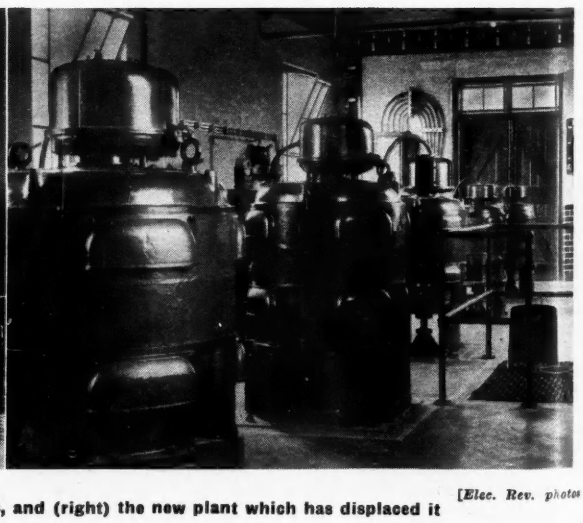




[*Elec. Rev. photos*

Above: The Dunmow showroom, and (left) a trailer showroom used in the Saffron Walden district





The old pumping plant at Rochford Sewage Works, and (right) the new plant which has displaced it [*Elec. Rev. photos*

Electrical Engineers from Overseas

THERE were about 150 people present at the conversazione of overseas members of the Institution of Electrical Engineers which was held on July 1st at the I.E.E. building. Included in this number were several members of the Council and of the Overseas Activities Committee, whose presence was essential to the purpose of the function, which is, as the President (who with Mrs. H. T. Young received the members and guests) pointed out, to enable electrical engneers from overseas to meet not only their friends but also those who are responsible for running the affairs of the Institution in the old country. Among these, of course, are Mr. P. F. Rowell and the members of the secretarial staff, who are so closely associated with the organisation of bodies of electrical engineers in other countries.

In addition to the twelve committees in leading cities of the self-governing Dominions and of the Colonies, there are local centres in the Irish Free State, China and Argentina and honorary secretaries in ten other large towns, of which five are in foreign countries. Actually the Institution has members in twenty-three countries of Europe, seventeen of Asia, eighteen of Africa and thirteen of America.

These annual conversazioni are more informal than the name might denote, and everything is done to make them a real foregathering. Thus the "done thing" is for everybody to introduce themselves to everybody else, a procedure that is made easier by means of the badges provided, upon which the names and countries of the wearers are legibly indicated as in other years.

At the I.E.E. Overseas Conversazione:—1. Mr. and Mrs. J. S. Jenkins (Straits Settlements), Mr. D. H. Macnee (Australia) and Mr. A. S. Mohan (India). 2. Mr. and Mrs. A. G. Tremain (late of Malaya) with Mr. and Mrs. W. E. Tremain (Argentina), Mr. W. G. Hendry (India) at the back (right). 3. The President and Mrs. H. T. Young welcome Mr. and Mrs. S. P. Chakravarti (India). 4. Mr. and Mrs. E. F. Cater (Brazil), Mr. H. S. Bulley (India) and Miss H. Goldsmith. *[Elec. Rev. photos*

After the reception the company passed on to the lecture theatre, where Dr. P. Dunsheath gave a short address on "The Electron at Work and Play," followed by talking films of Sir Oliver Lodge and Col. R. E. B. Crompton.

Dr. Dunsheath's lecture consisted largely of a series of demonstrations, with the aid of lantern and epidiascopic slides, of the causes of ionisation in high-voltage cables. It is to investigations along these lines that developments in cable practice in recent years have been largely due. His main theme was that whereas the electron when confined to its conductor or liberated therefrom under carefully controlled conditions was literally invaluable, its escape could have disastrous consequences.

The effect of bound electrons at a surface between two liquids with different dielectric constants was one of the pictures thrown on the screen. First globules of castor oil were released into transformer oil of only half their dielectric value, the difference causing them to be drawn swiftly into the field produced by two spherical electrodes; then castor oil was used as the main medium and the transformer oil was introduced in drops to be as evidently repelled from the field. Another epidiascope experiment showed how the compound could migrate from a cable end if cut off square resulting in a flash-over discharge.

Perhaps the most fascinating demonstration was that of the instantaneous formation of Lichtenberg figures by the application of high voltage to a rod electrode standing on an insulating plate, dusted with sulphur, above a lower electrode. Positive and negative figures have quite different characteristics. Lichtenberg figures have been known for 150 years, but have only lately come to have practical significance. They are believed to be the origin of "tree-burning" of cables as from the tips of their streamers a spark discharge may develop. They have found practical application in the klydonograph for recording the time, magnitude and polarity of surges on transmission systems. As the experiments were conducted at voltages up to 33 kV, another matter for wonder was the way in which the temporary connections survived.

The talking films were taken at the end of 1934 and form part of the collection which the Institution has had prepared of elder eminent members of the profession, whose active presence among us to-day will surely be the envy of future generations. It was good to hear Sir Oliver Lodge speaking of the coming of the dynamo (he was born in 1851) and of the early investigations of Kelvin and other pioneers. Many will feel, too, that he did not rate Clark Maxwell too highly in putting him on the same scientific plane as Newton. Sir Oliver's last word was in defence of the ether of space as the substance that held matter together and the seat of all potential energy.

Col. Crompton, now in his 93rd year, told us how having initiated mechanical transport in India he turned his thoughts to making electricity of practical use, how Swan's lamps called for a demand for the dynamos he built at Chelmsford. The first distribution scheme was, he said, laid down in Vienna after the destruction by fire of the State Theatre, when it was decreed that all theatres in the capital should be lighted by electricity. These were supplied from a generating station containing four 250-h.p. steam dynamos operating in conjunction with batteries to give a supply on a 500-V five-wire system.

The films took from seven to ten minutes each and allowed for frequent change of pose on the part of the speakers, whose demeanour and delivery showed few signs of advancing age. The last part of the evening was given over to a reunion in the library, where there was every indication that "the party was going well." There is, however, more in it than that. Such meetings symbolise the welcome that the I.E.E. offers at all times to its members coming from other lands and also the interest it takes in their careers in whatever part of the world they may be.

Pulverised Fuel. By Vernon Walker, A.M.I.E.E.

Recent developments in the United States

PRACTICE in the United States with regard to the furnace heat release obtained with pulverised fuel, varies from 11,000 to 50,000 B.th.u. per cu. ft. per hr., according to data collected by the Prime Movers Committee. The principal factors determining permissible combustion rate in a pulverised-fuel furnace are the size and linear dimensions of the boiler furnace, the type of firing, and the furnace-wall construction. The combustion rate should ensure that the temperature of the gases leaving the furnace or entering the boiler tube bank is below the fusion or softening temperature of the ash. If the ash is cooled before coming into contact with the boiler tubes there will be little or no difficulty due to slagging of the tubes.

Comparatively small water-cooled furnaces burning coals of high ash content may be satisfactorily operated at combustion rates up to 35,000 B.th.u. per cu. ft. or even higher. On the other hand large furnaces may have to be limited to rates perhaps as low as 27,000 B.th.u. per cu. ft., while with low fusion ash still lower rates may be necessary. The limits are approximately the same for either dry-bottom or slagging-type furnaces.

The type of fuel firing equipment may affect the heat release by determining the rate of combustion and, therefore, the velocity of gases through the furnace for complete combustion. When all the combustion air is supplied to the coal at the burner complete combustion may take place at a point 14 ft. from it. On a similar furnace with burners having delayed admission of secondary air 3 ft. of flame travel may be required.

The greater the cooling effect of the furnace and the higher the fusing temperature of the ash, other factors permitting, the greater the permissible heat release. With refractory furnaces it is not advisable to exceed 27,000 B.th.u. per cu. ft. per hr. Coal having a fusion temperature of 2,100 deg. F. on dry-bottom furnaces has permitted heat releases up to 23,000 B.th.u. per cu. ft. per hr. With ash fusing at 1,900 deg. F. it has been found that the heat release must be limited to 17,000 B.th.u.

One-side Firing

The present trend in burner position is towards one-side firing, as this arrangement lends itself more readily to the bunker and pulveriser situation. In general, vertical firing is adapted for furnaces having dry bottoms where head room permits sufficient height to obtain a long flame travel, and thus prevents combustion occurring in the lower tube bank of the boiler. Wet-bottom furnaces are preferably fired horizontally, or with a slight inclination towards the bottom of the furnace, in order to maintain a high temperature of the slag and to dposit as much ash as possible in the slag pool and permit tapping on light loads. Satisfactory results have also been obtained with "tangential" burners placed at the corners of the furnace.

With this type of firing slag flows readily with loads of from 50 per cent. to full load. The side walls of the furnace are tubes with no covering of any sort. Heat release from the furnaces of boilers of the cross-drum type with slag tap furnaces averages 39,000 B.th.u. per cu. ft. per hr. on full load.

Between the boiler furnace and the superheater are two relatively small open passes, and there is no boiler convection bank ahead of the superheater. The walls of the open passes are of partial stud-tube construction presenting a high heat absorbing surface for cooling the gases and slag. Slag from the first open pass will drop to the bottom, which will be maintained at a high temperature by full stud tube covering and radiation from the furnace, thus melting the slag and permitting it to run back into the furnace. Dry ash from the second pass falls through the screen at the bottom into the ash hopper. The ash and slag in the furnace gases pass through the sticky stages to dry granular slag, not among boiler or superheater tubes, but in open passages where the minimum of fouling can occur. The gases are reduced to a temperature of 2,000 deg. F. before entering the superheater. The length of flame travel from the vertical burners to the superheater is 75 ft. Experience has indicated that, with coals having an ash of high fusion temperature, the dry-bottom furnace is more satisfactory than slag-tap furnaces, as less time is required for ash removal, it costs less to maintain and it can be cooled down more quickly for working inside.

Removal of slag from boiler slag screens and superheater tubes continues to require considerable labour, but wide spacing of the tubes where the gases enter the boiler assist in reducing this. A relatively low heat release and long flame travel, so that combustion is completed before the gases reach the tubes, are also helpful. In wet-bottom furnaces a dust screen shades the boiler and reduces the temperature of the gases to a point where slag does not adhere to the boiler tubes. The screen also maintains a high temperature in the lower part of the furnace, to facilitate slag tapping. In general direct firing seems to be preferred on account of the elimination of pulverised-fuel bunkers and transport equipment. The bin and feeder system, however, has a number of advantages, such as close control of combustion and greater reliability and flexibility. The pulverising costs are also generally lower and operation is safer.

Costs and Power Consumption

Operating and maintenance costs vary from 8 to 24 cents per ton of coal burnt for the central systems and from 2.5 to 17 cents per ton on unit systems. Power consumption varies from 14 to 29 kWh per ton. When burning anthracite, the power consumption is increased to between 33 and 35 kWh per ton. Furnace maintenance has been materially reduced by weekly inspections and noting the effects of service on the furnace walls, such as slight openings between holding tiles to allow for individual expansion, dry vertical joints and the size and shape of brick to use in a particular situation.

The principal feature of the new "bowl" pulverising mill is a revolving grinding chamber. Coal which is ground between the reduction rolls and grinding ring, works its way up the bowl due to centrifugal force. As the ground particles reach the rim the fines and intermediate sizes are carried by the air current coming up from the annular spaces around the bowl into the separator above for further classification. As the finished material is separated out the over-size particles drop back and re-enter the mill with the raw feed. The rolls are held in a fixed position by journal heads supported on trunnions that rest on the top plate of the mill. Clearance between the rolls and the revolving bowl may be adjusted from the outside while the mill is running. The life of the grinding elements is inversely proportional to the quantity of ash and pyritic sulphur in the coal and bears no relation to ease of grinding.

Mill casings are maintained by welding plates either on the inside or outside. Any worn parts of spiders, centre shaft housing, etc., are built up by welding even though of cast iron. The bottoms of wind boxes are lined with a thin layer of cement and the sides with a plastic material, such as roofing putty. Cyclone separators are also lined with a plastic material such as roofing cement and a very thin layer of concrete trowelled over the top.

Direct-firing Unit System

A unit system for the direct firing of pulverised anthracite culms and silts, which have been considered unmarketable as fuel, has been developed. Anthracite silt containing as much as 20 per cent. moisture, and as little as 2½ per cent. volatiles, can be direct fired without mixing with any other fuels, and also without pilot burners. Ignition is accomplished by means of the lighting torch usually employed for lighting bituminous coal burners. The method is successful because means are provided for the removal from the primary air and coal mixture entering the burner of sufficient primary air to reduce the air-coal ratio leaving the burner nozzle to the correct value necessary for the maintenance of stable ignition with the very low volatile anthracite culm used. Another reason is the fineness of the finished product (85 to 95 per cent. through a 200 mesh).

The separated air is diverted and delivered through special nozzles to the lower part of the furnace where it mixes with the secondary air admitted through ports in the lower half of the front wall. The required proportion, usually about two-thirds of the air in the coal-air mixture entering each burner, is diverted to the vent nozzles. Since the amount of air diverted from the burner can be controlled from zero to about 100 per cent. of the air to the burner bituminous coal which requires high ratios of primary air to coal may be fired through the same burner with equal case.

A New Heat Treatment Station

A heat-treatment and metal-degreasing demonstration centre is to be opened by Imperial Chemical Industries, Ltd., at the works of their subsidiary company, Lighting Trades, Ltd., at Earlsfield, S.W.18, early in August. The installation will include a representative range of electric, gas-fired and oil-fired furnaces and an expert metallurgist will be permanently in attendance. The processes of case-hardening steels in cyanide and deep cementation in "Rapideep" and the heat-treatment of alloy steels in salt baths will be seen in operation. High-speed steel hardening by the "Carboneutral" process, which eliminates the need for decarburisation, will also be demonstrated. A demonstration of I.C.I. metal-degreasing plant will also be staged here. Apart from the standard range of nine plants shown, special models (gas, steam or electrically heated) are designed for particular requirements.

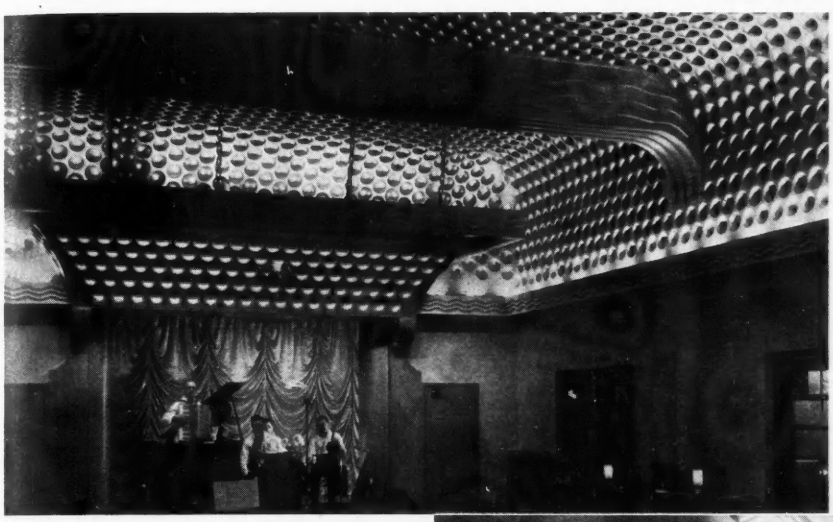
Artistic Lighting.

By J. B. Harris, Grad.I.E.E.

Adaptation to modern architecture

THE progress of architecture calls for similar development in the equipment of buildings. The electrical industry has not been backward in realising its responsibilities, and the designer of the building of to-day has good modern examples of heating and lighting equipment at his disposal. Electric lighting, especially, has made great strides during the last few years, and the modern tendency is for lighting to be utilised not only for the provision of illumination, but also as a means of decoration.

In view of both these considerations, it is necessary that there should be early co-operation between the architect and the lighting engineer. In the recent Texas Centennial Exposition, for instance, the illumination was planned in step with the general development of the architectural detail, and in this way it was possible to obtain an entirely satisfactory result, the lighting being used to its fullest extent as a means of architectural expression. The illuminating engineer of to-day must be a combination of artist and technician. He must be able to fully co-operate with and understand the requirements of the architect, and at the same time consider the problem from a scientific point of view.



Lighting aided by special ceiling design (Holophane)

It is obvious that objects are seen only when illuminated, and it is therefore necessary to plan the quantity, colour and direction of the incident light when considering required effects. Visual acuity depends very largely upon intensity of illumination; thus fairly high light values will be needed in order to "bring out" the details of, say, a piece of sculpture. From early times architects have based their designs upon considerations of natural illumination and type of climate. In southern climes exterior decoration is brought into prominence by strong sunlight, while in northern countries ornamentations have deeper profiles in order to obtain satisfactory shadows from overcast skies. Shadows are very important since they stress solidarity and emphasise shape, and thus the angle of projection of the light beam must be considered. For instance, a sculptured head may be given either a harsh or soft appearance, depending upon the situation of the light source.

Rectangular fittings, each housing three 100-W lamps, in an American store (Holophane)

A certain London store has a ceiling treated with diagonal triangular plaster projection and the light from suspended fittings casts shadows, giving the ceiling an ornamental appearance, which is certainly superior to a plain untreated surface. By obtaining shadows formed by coloured light sources it is possible to obtain interesting decorative effects. Colour, too, is important, especially where pictures and tapestries are concerned. For instance, a red object will appear at its best when illuminated with red light, blue objects with blue light, &c. Contrast is another factor which may be utilised to great effect by lighting specialists.

The modern tendency in illuminating engineering is to utilise large areas for the distribution of the light, *e.g.*, indirect lighting from ceilings, and direct lighting from false windows and glass panels built into the structure. It is not always desirable, however, to arrange the lighting so that these areas have an absolutely uniform appearance, since this tends towards monotony. It is better to arrange for a lighting graduation, definite contrasts in brightness values being planned where emphasis is desired. This, however, does not excuse a central dark band in the ceiling often present where cornice lighting is used, resulting from the use of inadequate reflectors or the incorrect position of the cornice. Optical illusions play a great part in lighting application, a well-known example occurring in the floodlighting of buildings. If a column is illuminated, and is set against a dark background, it will appear larger than if seen in silhouette against a bright background. For emphasising the loftiness of a church, it is best to concentrate the light in the pews and lower parts of the building.

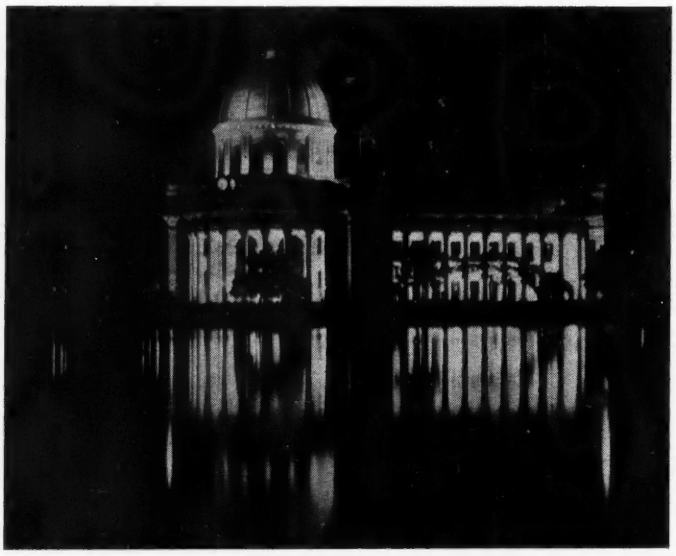
When planning a lighting scheme it becomes necessary to consider the psychological factor. Thus, if an interior is decorated in orange or red colours a warmer atmosphere will be imparted to the room than if blue predominates. All surfaces reflect light to a greater or less degree, in various ways. A rough surface will reflect light of a diffused character, while a glossy surface will give specularly reflected light. Most surfaces lie between these two limits, and the latter should only be used when it is desired to produce a feeling of gaiety and cheerfulness, and avoided when leading to garish effects. The æsthetic side is often overlooked, especially when carrying out floodlighting schemes. Here the main object is to obtain an effect without an apparent cause, and the visible presence of projectors does much to spoil an otherwise satisfactory scheme.

Glass and Marble

Glass itself, is used to a great extent for controlling light, and correct application will give the installation a decorative quality. For instance, concealing the light sources by surrounding them with a series of glass rods, results in multiple reflections. Glass in the form of bricks, each a foot square, and cemented together by a transparent substance, may be used as a decorative element in conjunction with electric lighting sources. For instance, these glass bricks provide an attractive feature for the archway entrance of an exhibition, a stimulating effect being produced when a luminous source such as neon tubing is placed behind them. These elements

were used to a great extent in an American exhibition in 1933. A building was constructed of glass bricks, and lighted internally, and the glass was coloured by a translucent ceramic coating, resulting in the exterior appearance of large coloured luminous surfaces.

Another element recently introduced as a light source diffuser, and possessing decorative qualities, is known as "luminous marble." It is possible to obtain this material in a variety of natural colours and thicknesses, but at present it is only available for flat surfaces, and hence its use is restricted to luminous panels. For use in interiors, the thickness of the material may be a quarter of an inch, and its relative brightness is such as to recommend its use where large areas of luminous surface are required. If it is desired to create the effect of a warm atmosphere, "lumar red" may be used, while another variety of the material gives the natural appearance of sunlight colours with green bands. The material could be used extensively in restaurants, cafés and exhibitions where brightness is required.



General Post Office, Calcutta, with silhouetted columns

Gaseous discharge tubing is now being increasingly used for interior illumination, and novel effects may be obtained where three-colour sources are placed in a cornice for indirect lighting. For restaurants and theatres, this is an ideal form of lighting, and it is also possible by the use of opal gas tubing to use these sources for the provision of direct lighting and decoration. Fluorescent powders produce many beautiful effects at a fairly high luminous efficiency.

Recent national celebrations have shown that picturesque effects may be achieved from the night illumination of gardens and parks, and this method of increasing the electrical load should certainly be encouraged. Concealed lighting of flowers and foliage by coloured lamps will enhance their natural beauty. Such is the interest in this sphere of lighting, that many private houses have general garden lighting, together with local units for the illumination of flower beds. Statuary may be best treated by the use of concealed spotlights arranged with regard to light incidence to produce a dramatic effect.

One of the most interesting of outdoor illuminations concerns the lighting of fountains. Suitably arranged coloured sources with dimmers give sparkling and scintillating appearances to water sprays, and this may be aided by underwater lighting. As to the expense, summer electricity bills are always lower than those of winter quarters.

Artistic lighting is not necessarily confined in application to large buildings, and the growing tendency is to make use of decorative illumination media for drawing rooms, lounges, &c. Modern lounges dispense with the use of central ceiling fittings, and utilise indirect lighting by means of floor standards or wall brackets, together with decorative features such as wall alcoves and concealed lighting for curtains.

Electric fires are frequently designed incorporating coloured lamps, and when these are switched on in conjunction with the main lighting, very pleasant results are achieved. The design of such installations is not a question of watts per square foot, but one of correct balance of light and shade.

Architectural lighting has developed to a great extent in America, and rapid progress is being made especially in the subject of shop and store lighting. The value of lighting as an aid to sales is fully realised, and electricity both for exterior and interior illumination, plays a great part in advertisement value. The lighting is not only attractive but also of a relatively high intensity. One particular retail store utilises indirect lighting from ceiling coffers and units installed on the tops of showcases, the whole scheme giving an average intensity of 30 ft.-candles. The fitting room illumination is 100 ft.-candles, and this contrasts with the 10 or 15 ft-candles employed in the majority of London stores.

Another sphere in which American lighting engineers are making great headway is in the illumination of transport vehicles.

It is obvious that there is still plenty of scope for improved lighting in this country, both from the utilisation and decorative viewpoints.

Heatherwood Hospital Extensions

HEATHERWOOD Hospital was established in 1920 by the Council of Management of the United Services Fund for children of ex-service men suffering from surgical tuberculosis and other orthopædic diseases and was transferred to the London County Council in October, 1934. The hospital, when taken over, consisted of three single-storey ward blocks. A new one-storey block has been built to contain 100 beds and a new wing has been added to the nurses' home to provide accommodation for fifty-five nurses and maids. The cost of the extensions has been approximately £72,000. The electrical installation comprises general, night and individual bed lighting in the wards together with an outlet point at each bed for the use of electrically heated air bottles. Similar provision for hot bottles is made for the beds on the terraces. Power sockets are provided in the wards for the use of X-ray and other electro-medical apparatus. Provision has been made for a radio service, and the existing synchronised impulse clock system has been extended. New automatic telephones and a fire-alarm system have been provided for the whole of the hospital. The staff home is provided with electric light and call bells. The electrical contractors for the work were Read and Partners, and the following makes of apparatus were installed:—Switchgear link boxes and sub-distribution units, Kartret Switchgear Co., Ltd.; main cables, W. T. Henley's Telegraph Works Co., Ltd.; conduit and special wall sockets, Walsall Conduits, Ltd.; fittings, T. C. Moore & Sons; clocks, Synchrome Co., Ltd.; telephones, Ericsson Telephones, Ltd.; fire alarms, Gent & Co., Ltd.; "Halcyon" radio receivers, Ismay Products, Ltd.

The new wing of Heatherwood Hospital

The Electric Knife in Surgery

By E. H. Turle, M.I.E.E., A.I.Mech.E., M.I.R.E.

ELECTRIC current at low frequency is limited by the resistance in its path and by the effective voltage available to overcome it. The energy thus absorbed is dissipated in the form of heat in the resistance, according to the current flowing. This relationship, as formulated by Ohm's Law, does not hold when a high-frequency voltage is employed for driving the current through the resistance of animal tissue,

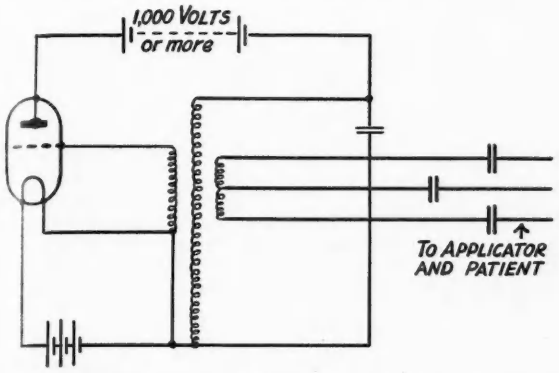


Fig. 1.—Circuit with oscillating valve for use with h.f. electric knife

because the cells of such tissue, being in effect a number of minute condensers, permit so marked an increase in the current circulation that a temperature rise destructive to tissue is rapidly reached.

The frequency employed varies as best suited to the nature of the operation, and is usually between 500 and 5,000 kilocycles per second. The heat produced by 0.75 A of h.f. current passing through the wrist rapidly becomes unendurable to the patient.

The high-frequency "knife" employed in surgery usually comprises a clamping device rigidly holding a needle or some other special form of electrode, the current through which is controlled by a finger switch in the handle or by a foot switch on the floor beneath. The greatest heat production occurs immediately in front of the points of the electrodes and the heating of animal tissues by this means is so intense that caramelisation of the tissue itself and coagulation of any albumen or blood can very quickly be effected. In order to localise and concentrate the current density, and therefore the heating effect, the electrodes are made very small for handling by the surgeon. Using the point of an ordinary fine sewing needle as such an electrode and applying it to animal tissue under suitable conditions quickly produces a temperature above boiling point at the selected spot. The liquid in the tissue is thus converted into water vapour so rapidly that minute steam explosions occur continuously, and this bursting produces a clean-cut separation of the tissues equivalent to that of a clean cut with an ordinary steel scalpel.

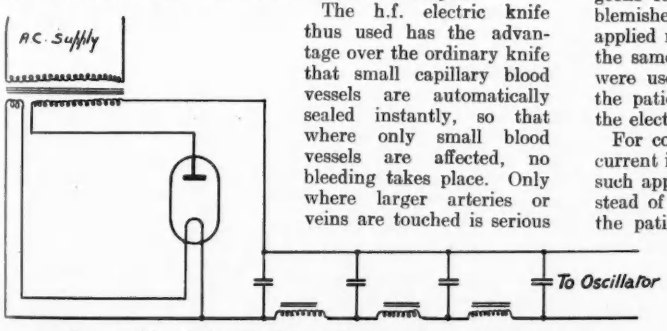


Fig. 2.—Circuit for providing direct current to knife from a.c. supply

The h.f. electric knife thus used has the advantage over the ordinary knife that small capillary blood vessels are automatically sealed instantly, so that where only small blood vessels are affected, no bleeding takes place. Only where larger arteries or veins are touched is serious bleeding possible, and in dealing with these some surgeons omit entirely the use of clamps on the exposed ends of veins and arteries. Instead they temporarily close the severed blood vessels with tweezers and by then rapidly sealing the ends by momentarily touching them with the electric knife, the tweezers can forthwith be removed.

The so-called "surgical shock" upon the patient is markedly reduced when the electric knife is used, by reason of the exposed ends of nerves in the tissues being also sealed, apart from the smaller blood vessels. Far more rapid healing results from this method of operation on living tissue than when the ordinary surgical knife is used. The radio-electric knife cauterises the edges as it cuts, whereas when the ordinary knife is used for the surgical removal of malignant tissue there is always the serious risk that even temporary bleeding will cause infected matter to reach the blood stream and thus be carried to another part of the body, there to develop the same disease afresh. This does not occur with the electric method, as the current effectively destroys the malignant matter and it can then be removed as harmless refuse; so that, having regard also to the absence of bleeding, this is much the safer method.

At least two electrodes are necessary for operations. The "common" one must have a large surface area to avoid undue heating so that it can be placed in contact with, say, the patient's thigh without producing unnecessary discomfort. The "active" electrode may vary in size from more than one inch in diameter to a sharp pointed needle of the order of 0.005 in. diameter. It can be of various shapes as best suited to the surgical work required, and is designed for application to the precise spot where localised and intensive heating is required. For the destruction or removal of, say, a tumour two "active" electrodes are frequently used, one on each side.

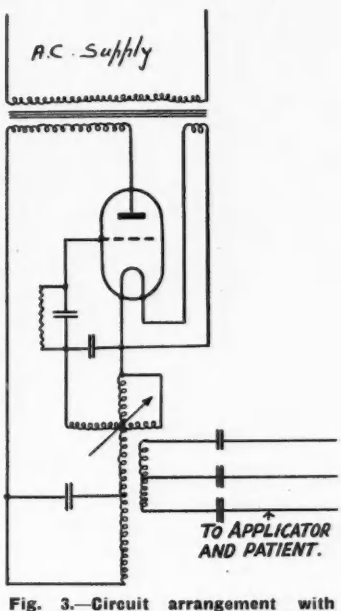


Fig. 3.—Circuit arrangement with valve acting as both rectifier and oscillator

Sparking Methods in Application

When tissue has been broken or cut in an accident, the electric knife can successfully be used merely to stem the bleeding. For this purpose it is held near to (but not allowed to touch) the tissue and sparking under the control of the operator is allowed to take place through the thin layer of air between the knife and the tissue from which the bleeding issues. This film of air becomes hot enough to coagulate the tissue *en masse*, using a frequency of about 1,000 kc.

This sparking method is often satisfactorily adapted by surgeons for the removal of warts, moles and other surface blemishes of a like nature. For such treatment the current applied must be kept relatively weak, since if h.f. currents of the same order as those utilised for other surgical operations were used, they would be likely to cause serious injury to the patient. Thus, shorter and thick sparks are utilised for the electro-desiccation of tissue.

For controlled sparking the most satisfactory source of the current is, at present, the Tesla coil or the Oudin resonator, as such appliances will produce monopolar current for which, instead of the normal return path, the capacity effect between the patient's body and "earth" will suffice. Such appliances, to be effective must be "earthed" by a lead of low impedance.

The electric knife is being used very successfully for the removal of tonsils and for the normal operation on the prostate gland. The employment of the ordinary steel knife in the latter case is attended with a mortality rate of the order of 50 per cent., which appears to be reducible to under 10 per cent. when the electric knife is utilised. Many other applications are now being widely practised by surgeons, dermatologists and other specialists.

Unfortunately, marked muscular contraction is liable to accompany the use of the electric knife. Although this effect is reduced proportionally to an increase in the frequency employed, the actual movement finally resulting varies considerably with individual patients. With some patients the

muscular contraction is sufficient to push the tissue upward toward the electrode, but with others the movement is almost negligible. Any twisting of the muscles is always liable to jerk the electrode too close to large blood vessels, or delicate internal organs, and for these reasons the muscular movements must be limited as much as practicable by suitable control of the frequency and current values.

The cause of this effect lies in the varying electrolytic properties of the semi-liquid cells comprising animal tissue, and their consequent response to h.f. current traversing them. In a relatively few cases, in order to ensure absolute control by the surgeon of the cutting device used in a major surgical operation, and to prevent interference with his work by any appreciable upward movement of tissue, it may become advisable to substitute a steel-bladed scalpel for the safer completion of the operation.

Producing H.F. Currents

Whenever moderate values of current will suffice, oscillating vacuum valves have the valuable merit of producing a much smoother current, the output of a valve being a continuous wave, whereas a spark-gap oscillator produces a damped wave output. When relatively large currents are necessary or desirable, the cost of vacuum valve oscillators is at present prohibitive and recourse is generally made to oscillators of the spark-gap type.

Fig. 1 shows one of the simplest types of oscillating valve circuit for use with the h.f. electric knife. It requires a d.c. input at 1,000 V or over, which makes it unsuitable for portable use, but it is practicable to substitute rectified and smoothed a.c.

Fig. 2 shows a circuit using one rectifying valve and providing a rectified and smoothed unilateral output when energised from an a.c. supply. The same circuit can readily be modified to use both half waves of each cycle of the incoming a.c. supply, but two rectifying valves are necessary for this purpose.

Fig. 3 shows a circuit arrangement of either one or two valves which act as both rectifiers and oscillators. To control the input current in each of the above circuits, reactances are provided each with a series of taps connected to a selective switch which provides the preferable means of regulation. The output current to the patient is controlled by connections to the main resonators by suitably arranged taps on the main oscillating circuit condenser, which also is best provided with suitable taps and means of selection. A distinctive pilot lamp is generally employed to indicate when the appliance is in operation.

Summary of Advantages

Although many of the older surgeons practising to-day maintain that they can only do their best work by means of the ordinary steel scalpel, it is widely admitted that the electric knife, when used for cutting living tissue during surgical operations, has the decided advantages of coagulating the blood, cauterising the cut and sealing the nerve ends as it travels. Thus, bleeding can be instantly stopped, or prevented, without waiting while ligatures are tied round the ends of blood vessels. This method is of special value when removing malignant growths and performing operations on infected tissue. Further, there is a smaller amount of after-pain during the healing period.

Broadly, the electric knife is used for (*a*) electro-desiccation, using thick sparks; (*b*) for coagulation (*e.g.*, after accidents) using a frequency of about 1,000 kc.; and (*c*) for electrosection, using the film of hot air traversed by the sparks, as a "cutting" medium with a current frequency of as much as 5,000 kc.

Progress at Birmingham

PRESENTING the annual report of the Electric Supply Committee at last week's meeting of the City Council, the chairman, Sir Percival Bower, intimated that further reductions in charges were to be made, and said that the committee's policy was to give the cheapest possible supply, recognising that electricity could become the "life-blood" of industry. When the committee had a surplus, as in the past year, it immediately considered the claims of those who, by using electricity, had created that surplus.

This policy was challenged by Sir John Burman, who thought the committee might have saved the City Council the necessity of increasing the rate by 6d., but from the point of view of development of the undertaking it was fully justified by the results for the past year, during which general reductions in charges were authorised.

The Department, of which Mr. F. Forrest is engineer and general manager, last year sold approximately 708 million kWh within its area, an increase of more than 92 million kWh (15 per cent.) over the previous year's sales. This expansion, coming on top of an increase of 62½ million kWh in 1935-36, is regarded by the committee as very satisfactory. In addition, nearly 158 million kWh was supplied to the Central Electricity Board for use in other parts of the Central England Area.

Revenue was £2,868,963 and the trading expenditure amounted to £1,942,983, including £33,178 in respect of the cost of system and voltage change. The balance carried forward to net revenue account was £925,980, and miscellaneous receipts increased this to £954,788. After meeting capital charges, income tax, &c., the surplus on the year's working was £363,207, as compared with £255,341 in the previous year. It was thought advisable to utilise £267,733 in meeting expenditure which would otherwise have been charged to capital, and the balance of £95,474 has been carried forward to the current year's account.

Further progress was made on the important work of changing over from d.c. to a.c. and of increasing the pressure of supply on extra-high-voltage transmission. The cost of these works on consumers' premises, including new meters and service alterations since a start was made five years ago, has been £437,731.

The standardisation of system frequency in accordance with the Central England Electricity Scheme has been continuously proceeding. A sum of £2,000,714 has now been expended on this work.

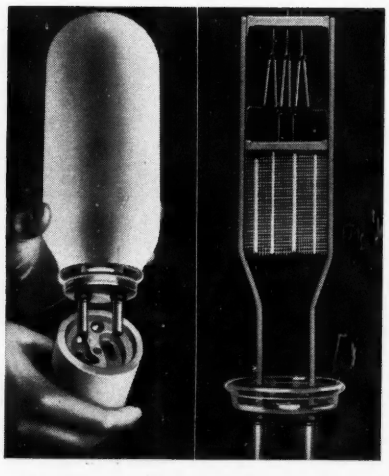
Satisfactory all-round progress was made during the year. The number of additional consumers was 36,106, bringing the total at March last to 218,365. New connections aggregated 135,268 kW, making the total 798,952 kW.

A survey of the progress made during the past five years shows that the quantity of annual sales has increased by 82 per cent., the number of consumers taking supplies by 83 per cent., and the undertaking's connected load by 79 per cent.

In moving a recommendation that the committee should be authorised to spend £350,000 to meet the estimated cost of extensions to the general mains system to September 30th, 1938, Sir Percival Bower said that the total spent on the general mains system in the last six years was £1,709,481, with an additional £11,671 on traction mains. Over the same period the committee had spent out of revenue, instead of raising capital, £78,804, and in connection with the services given to consumers, £414,598. Those figures, he contended, showed sound financial practice. The extensions to mains were so rapid in the outer areas of the city that e.h.v. cables had had to be laid direct from the Hams Hall generating station to Solihull, King's Norton and Northfield to supplement the supply.

A Robust Electric Lamp

A new type of 1,000-W lamp for general service is described in the official organ of the American I.E.E. The internally frosted tubular bulb is made of heat-resisting glass with a low co-efficient of thermal expansion so that wide temperature changes cause no breakage. Its bi-pot base is set to give more accurate focusing of the filament, a simplified socket and a more reliable electrical contact, and also to simplify production. Two grids mounted above the filament inside the lamp collect much of the deposits which in lamps of the ordinary type blacken the bulb.



The new American 1,000-W lamp with a number of improvements in design

Traction Equipment Production

Activities at the English Electric Preston works

SPECIAL trains on consecutive days last week conveyed a large number of home and overseas guests of the English Electric Co., Ltd., from London to Preston for a tour of inspection of the company's rolling stock and vehicle body works. The visitors were welcomed on arrival by Mr. G. H. Nelson, chairman and managing director, the subsequent inspection of the various shops emphasising the magnitude of the company's organisation and its wide range of activity.

Apart from the domestic appliance factory and a display of control gear, motors, water-turbine parts and other products of the company's constituent works elsewhere, two large generator rotors (for the Yorkshire Electric Power Co. and a switchgear testing station) were noticed undergoing machining operations in what used to be the heavy machine shop. This has been largely cleared and now serves as the main carriage erecting shop, having been specially

Bus body paint shop

adapted for fabrication by electric welding, a method which is extensively employed at the Preston works.

Work seen in progress included four-coach articulated Diesel-electric trains of all-steel welded construction for the Ceylon Government Railways; also beside all-steel electric suburban rolling stock for the New Zealand Government Railways an 84-ton main line express electric locomotive, type 4-8-2, is being completed, together with nine further sets of

Main carriage erecting shop with under frames laid down on welding beds

electrical equipment to go with mechanical parts which are being built by the N.Z Government Railways themselves. These are to be used on the Wellington-Tawa Flats line on the 1,500-V d.c. system for mixed freight and passenger service. The locomotive has four 310-h.p. 750-V motors controlled by electro-pneumatic type gear which is arranged to enable the driver to notch up and notch back again through transition if desired. The control is also arranged for mul-

All-welded underframe of a power coach for the Ceylon Government Railways

tiple unit operation of two locomotives from any one driving position. The motors are arranged for quill spring cup drive and all the weight is spring borne, *i.e.*, no motor weight is carried on the road axles. The brake gear is arranged for Westinghouse straight air and electro-pneumatic operation, and special features include forced ventilated motors and filtered air. There is separate control of each pantograph from any driving position when operating two locomotives in multiple unit, and an oil-fired flash boiler for the heating of the train and the warming of the water in the lavatories.

Some of the 108 Diesel railcars which are being built for the Buenos Aires Great Southern Railway, the Buenos Aires Western Railway and the Entre Rios Railway were also seen in course of construction.

The 55-ton Diesel-electric locomotives to be used in the shunting yards of the Southern Railway are fitted with a 300/350 six-cylinder 6K-type engine manufactured at Rugby, a Bradford 240-kW main generator for the traction motors, each of 200 h.p., and an 11-kV auxiliary generator.

One of the Diesel shunting engines made for the L.M.S. railway was available for demonstration purposes, while the rail coach, which was built for demonstration purposes and has been in operation in various services all over the country, is powered with one type 6H compression ignition 200/220 engine built at Rugby, and the two 212-h.p. traction motors are supplied by a directly driven 160-kW decompounded main generator. The overhung auxiliary generator supplies power for the exhauster and fan motor, battery charging and lighting.

An oil-fired boiler is fitted for coach heating purposes and for enabling a trailer coach fitted with standard steam heating to be attached to make a two-car train. This type of car is used for feeder services and is capable of good acceleration as well as high maximum speed up to 65 m.p.h.

For the F.M.S. three motor coaches (with three trailer coaches) are each being fitted with two six-cylinder 180-b.h.p. steam engines which are supplied by a Sentinel water-tube

boiler. Each of the power bogies has six wheels and the axles are fitted with roller bearing axle boxes.

One hundred underframes and lower deck saloon framing are being made for double deck tramcars which are being built by the Glasgow Corporation. One double-deck trolley-bus has been sent to Moscow, while a single deck vehicle (also for Russia) was demonstrated in the works yard.

In addition to 150 bodies of composite construction for the Birmingham Midland Motor Omnibus Co., all-metal welded bus bodies are being made for Ashton-under-Lyne, composite single-deckers for Stockport, double-decker saloons for Oldham entirely sheathed in aluminium, a luxury type coach for South Yorkshire, and all-metal riveted bodies for Warrington. For Southend-on-Sea and Barrow bodies are being made specially to pass under low bridges, the upper saloon being on a raised platform with a sunken gangway on the offside.

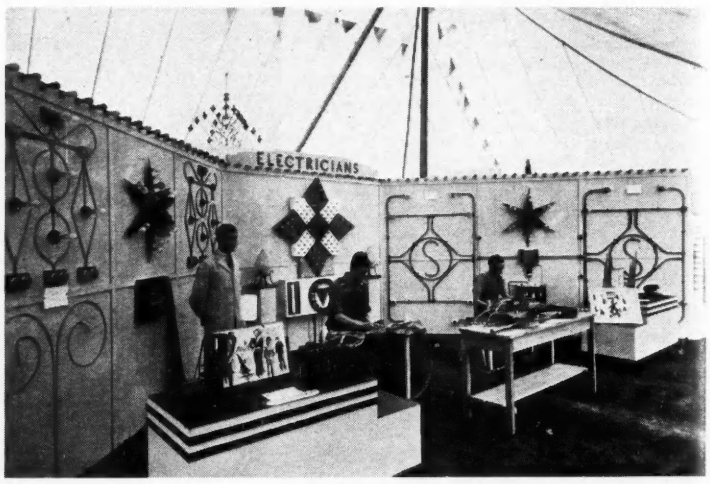
All metal work is treated with oil and varnish preservative prior to coating with "Carbolastic" paint.

Army Vocational Training

THE commanding and administrative officers of the Army Vocational Training Centre at Thornhill, Aldershot, were "at home" to guests yesterday afternoon (Thursday) when music and light refreshments followed tours of inspection of the various workshops which provided opportunities of gauging the quality of the work carried out by trainees and the nature of the instruction given to equip them for their return to civil life.

This training centre was established in 1927, and the number of men trained (increasing by 200 each year) in 1936 was 1,220, of whom 86.4 per cent. subsequently found employment. The value of the work carried out by the centre in 1936 was £14,322, representing an annual appreciation in value of £2,000 for several years past. All the workshops, a new lecture hall and a row of houses for the staff have been built by the students, who also installed the electrical equipment and other services entirely by themselves.

The number of students normally under training is 550, of whom 50 learn electric welding and 34 electric wiring; twenty different trades are taught. The preliminary training of electricians covers wiring systems, wiring out a sectional house, overhauling motors and switchgear, battery charging and installing and maintaining the electrical equipment at the Centre. When proficient the men work on jobs outside the Centre, wiring barracks, houses, &c., for the Royal Engineers and to the latter's specifications, thus ensuring that the students receive an excellent insight into actual building procedure.



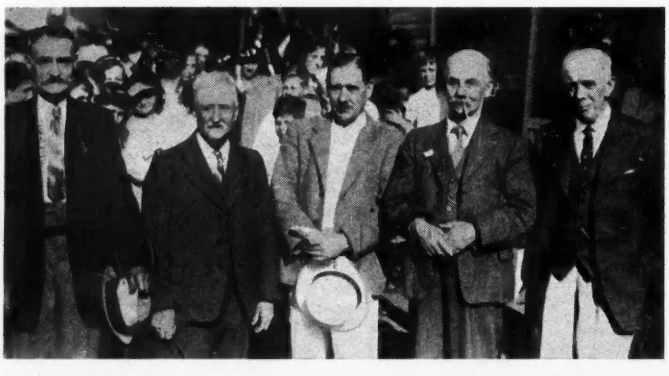
The electricians' stand at the recent display of the Army Vocational Training Centre at Aldershot

Electric arc welding, copper welding, lead burning, fitting, machining, sheet metal working and woodworking are other trades in which instruction is provided, many of the articles made being supplied to various branches of the services and utilised in Army buildings. Plumbing students learn how to joint telephone cables containing 500 pairs of wires encased in a wiped sleeve.

The training is intensive, consisting of a full-time course of 44 hours per week for the last six months of a soldier's service time. The system differs from that of a normal technical school, since training and production are combined, with concentration on sound practice rather than theory. Contracts varying in value up to £2,000 are carried out by the Centre for the War Department or units of the army, the work being done by students with instructors acting as foremen. Civilian procedure is followed, the students "checking in" and making out weekly time sheets in the usual trade manner. Training exercises are restricted to the earliest stages; very soon students are placed, according to standard, on productive work in the shops or on outside jobs where the atmosphere closely resembles civilian practice. Prospective employers are invited to visit the Training Centre.

An Interesting Centenary

THE firm of E. R. & F. Turner, Ltd., had its beginning in July, 1837, in a deed of partnership between Henry C. Bond, Walton Turner and George Hurwood, the object of the undertaking being to carry on business as iron founders and general engineers. Later Messrs. Bond and Turner retired and E. R. Turner, son of Walton Turner, came in, the firm being known for a short time as Hurwood & Turner. This partnership terminated in 1851, after which the business was carried on under the title of E. R. Turner & Co. E. R. Turner was later on joined by his brother, Frederick, and another partnership was formed under the title of E. R. & F. Turner. Mr. Peirson Turner and Mr. Leonard Turner entered the business as partners and in 1897 the firm was turned into a private limited company under the title of E. R. & F. Turner, Ltd.



Mr. A. Leggett, chairman of Turners, with four of the oldest employés. The total service of the quintet is 265 years (*E. Anglian Daily Times*)

During the early days of its existence the firm centred its activities on the manufacture of agricultural machines of all kinds. These included stone mills, horse gears, cake breakers and similar machinery, also small steam engines. Later it made portable steam engines and boilers, roller mills and maize-flaking plants.

Bull motors were first manufactured at Stowmarket in 1898 by the Anglian Engineering Company, and from the commencement the firm has specialised in the manufacture of "super-silent" motors, many of the original customers being makers of organ-blowing equipment. In 1919 the interests of both E. R. & F. Turner and Bull Motors came under the control of Agricultural and General Engineers, Ltd., and during this period the manufacturing interests of Bull Motors, Ltd., were transferred from Stowmarket to Ipswich. When reorganisation took place in 1933 the Bull business was acquired by E. R. & F. Turner, Ltd., and motors and generators ranging from 1/50 h.p. to 250 h.p. are now manufactured. This motor section of the company's business is very important, as Turners are believed to be the only organisation which embraces the actual manufacture of both milling and electrical machinery. Close co-operation is maintained between the milling and the electrical departments, and the valuable data compiled in the course of time has been applied when carrying out many mill electrification schemes.

The company's centenary was celebrated by a dinner at the Crown and Anchor Hotel, Ipswich, on July 2nd, the gathering of about 130 including many distinguished guests. Mr. A. Leggett (chairman and managing director) presided, and among the speakers were Sir John Ganzoni, Bt., the local M.P., Col. F. W. Turner, the Mayor of Ipswich and Mr. R. R. Stokes.

On the day following the centenary dinner a sales conference was held, followed by cricket and tennis matches.

Electrification of Agriculture. By F. E. Rowland

THE appearance of a book bearing the title of "Electrification of Agriculture and Rural Districts" by E. W. Golding (English Universities Press, 16s.) is very opportune, in view of the increasing interest in this subject. It should make a special appeal to supply engineers who are contemplating a more intensive development of their rural areas. The social and economical aspects of the problem are considered as well as the applications of electricity to agriculture and rural industries.

The first part of this work contains some interesting facts and figures on British agriculture and rural districts and discusses the power requirements for farms and rural areas. It is as well to be reminded of the importance of the agricultural industry, in which it is estimated that no less than £1,000 million of capital is invested, with a total net annual output of £2,000 million, and in which at the 1931 census nearly 1,200,000 people were employed, about 15 per cent. of the population.

The problem of under-nutrition is one which has been much to the fore lately, and there is much to be said for raising the standard of and for safeguarding the health of the community in preference to spending vast sums on remedying the effects of avoidable ill-health. Much of this is wrapped up with a satisfactory agricultural and food policy, which in turn is connected with mechanisation and electrification.

In the agricultural industry the output per man is extremely low compared with industries which have been mechanised to a greater extent, and whereas the average weekly wage of farm labourers in 1914 was 18s., it is now 33s., but the prices of agricultural produce are only about 6 per cent. higher. It is, therefore, essential that no stone should be left unturned to increase the output per person. It is also significant that the only home-produced foods which have increased in output during the post-war period are poultry and eggs, which are a branch of the industry in which the intensive method of farming has been widely adopted and which has been electrified to a great extent.

The estimated consumptions for farms of various sizes are worthy of close study. Thus it is considered that, for a 400-acre farm, a potential load of 35 kW is quite reasonable. Whilst most of the figures were prepared before the advent of electric dairy sterilising, it might be added that this load is an important one and can well account for 3,000 to 4,000 kWh per annum. A review of agricultural and rural electrical development in a large number of other countries makes interesting reading.

The second part of the book contains two chapters on elementary electrical engineering, and I would suggest that this section might have been dealt with somewhat differently, because the information is not required by technical readers, whilst the ground is covered in too much detail for the layman. There are a number of details in both these and the chapters which follow dealing with farming and domestic appliances which are open to criticism, such as the implication that portable motors are used to a greater extent than they actually are in this country. The statement that voltages above 400 or 500 must be regarded as dangerous and that for this reason those most commonly used for domestic and farm purposes are of the order of 200 to 250 V, might lead the uninitiated to suppose that the latter are so safe that no precautions are required with their use.

In the description of domestic refrigerators, the direct-expansion type machine is not mentioned, and as this type is now almost universally employed, this omission is unfortunate.

Should this book run into further editions, its value would be greatly increased if a number of practical errors were corrected, possibly with the collaboration of an industrial engineer, as has been done with the chapter on farm wiring. It is also suggested that decimals should be employed in place of fractions in calculations. The expression $\frac{1\frac{5}{16}}{1\frac{1}{2}} = \frac{45}{64}$ kWh is certainly somewhat unusual.

There is a useful summary of the applications of electricity to horticulture, which deals particularly with soil heating and greenhouse heating, whilst intensive illumination for plants and electro-culture are briefly touched upon. The book closes with a chapter on the problem of economic supply to rural areas, which is undoubtedly one of the most important aspects of the subject.

The opening sentence of chapter 2 reads: "Speaking generally, we have, as a nation, read and thought so much about our manufacturing industries during the past few decades that we are in danger of overrating their importance and of neglecting almost entirely the facts relating to agriculture." This is the best reason one can give for a study of this book, which should give many engineers responsible for rural areas much food for thought.

A Change-over at a Brewery

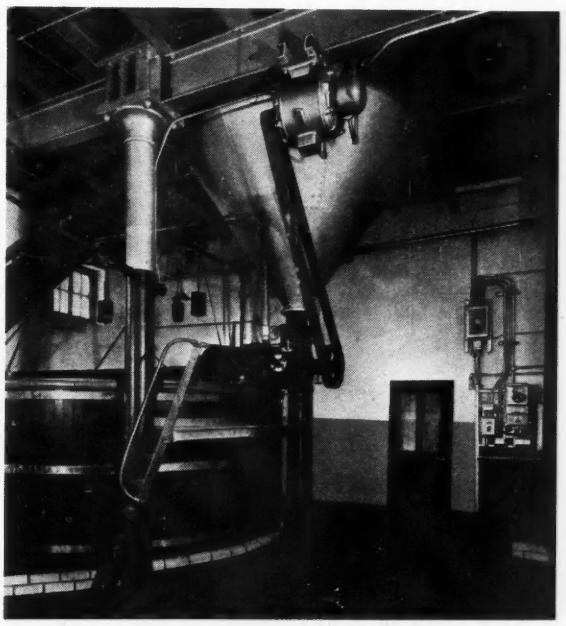
ONE of the breweries owned by Messrs. S. A. Brain & Co., Ltd., is situated near the centre of Cardiff and has been in existence for over 200 years. When it was decided recently to change over the electrical system from d.c. to a.c. a contract for "Witton" motors and control gear was placed with the General Electric Co., Ltd., particular care being taken to select appropriate motors for the various drives in order that the minimum number of types and sizes should be employed to reduce the stock of spares. Electricity is taken from the 400-V, 3-phase, 50-cycle mains of Cardiff Corporation.

One of two artesian well pumps is belt driven by a 20-h.p., 480-r.p.m. motor controlled by an oil-immersed stator switch and oil-immersed rotor starter and the other is controlled by an air-break rotor starting panel.

The malt is ground by mills which are belt-driven by 7½-h.p., 700-r.p.m. motors with air-break rotor starting panels and then fed from the grist case into the mashing machine, meeting jets of water in its passage. The 7½-h.p. motor which drives the mashing machine is suspended from a roof girder. These motors are of the slip-ring protected type. The malt extract, now known as "wort," is drawn off from the tun and boiled with hops. It is then, after straining, pumped through a cooling plant, having two motor-driven pumping sets, both driven by slip-ring motors of the drip-proof type. The "wort" pump motor is a 14-h.p. machine, and the cooling water pump motor is rated at 11 h.p. In each case air-break control gear is designed to give a variable speed of 1,410/1,310 r.p.m. and the motors are arranged for sequence starting.

After cooling, yeast is added to the wort for fermentation. The cooling plant for the yeast is belt driven, comprising a 5-h.p., 700-r.p.m. drip-proof squirrel-cage motor driving an air compressor and a 3-h.p. machine of similar type driving a CO_2 compressor, both controlled by direct-to-line contactor starters. A portable rotary pump is used for rousing the wort during fermentation. A ¾-h.p. s.c. motor with air-break direct-to-line starter forms the driving unit. An ammonia compressor driven by a 25-h.p., 290-r.p.m. protected type slip-ring motor is used for attemperating purposes.

When the malt extract or "wort" is drawn from the mash tun there remains the grain, which is prepared for cattle food. A 5-h.p., 1,420-r.p.m. s.c. motor drives the dry grains fan and a second fan for drawing off the vapour from the wet grain on its way through the drying machine is driven by a 5-h.p. variable speed slip-ring motor, 930/720 r.p.m. The grain drying machine itself is driven by the 20-h.p. slip-ring machine. There are numerous other G.E.C. motors installed in the works for such purposes as cask and bottle washing, &c.



A 7½-h.p. motor, mounted on a roof girder, driving a mashing machine

A Census of Domestic Apparatus. By Commercial Assistant

Some revelations at Blackburn

IN these days of rapid electrical progress it is very difficult to compile a record of appliances that bears any resemblance to the actual load connected. Some electrical contractors do endeavour to assist by furnishing details of the appliances supplied to their customers, but so many methods of purchase are open to the consumers that a considerable number of unrecorded appliances are connected.

It is of importance that records should be as complete as possible, and this has been emphasised in recent times by the periodical returns that are now required. In compiling these returns it has been the practice to take the details of "load" declared on the original application with the addition of appliances supplied through the showrooms of the undertaking or from information obtained from contractors. Such methods do not provide anything like an adequate record, and it is desirable in the interests of the individual undertaking, and the industry as a whole, that such a record should be obtained and periodically revised.

With a view to securing more accurate detail of the actual load of domestic apparatus a test was carried out in the early part of last year on a section of the consumers in the Blackburn area, and this test showed very clearly that the appliance records were far from correct. It was then decided to make arrangements for a complete census of every type of electrical appliance on consumers' premises.

A census card was drafted to supply the following information:—Number of lighting points; number and description of the various types of domestic apparatus and wattage; and number, detail and horse power of motors installed. Each item of domestic apparatus, from cookers down to blankets and coffee percolators, was included in the draft form. In addition to the census card an analysis card was drafted to contain the summary of the individual records from consumers' cards.

The staff detailed to carry out this census consisted of the meter inspectors and canvassers, the meter inspectors being fully employed on this duty between the normal quarterly and monthly readings. The average number of cards completed daily was forty, the enumerators being instructed to make full use of the opportunity offered to discuss with the consumers the advantages of electric cooking, water heating, &c. Full use was made of this opportunity during the census, with the result that a considerable number of orders were obtained. Throughout the census the staff have had far more opportunities of "meeting" the consumer, and this has proved of benefit both to the consumer and the undertaking, a "contact" being made which was of far more value than that of the periodical visit of the meter inspector, whose advent reminds consumers that another bill for electricity will soon become due.

It was expected that many difficulties would arise in carrying out this census, as work of this nature requires very tactful approach; certain consumers believing, very profoundly, that "the Englishman's home is his castle" are resentful of inquiry and feel sure that there is "something behind it." Some very interesting and amusing letters were received; one declared that the writer had been a consumer of electricity for over eighteen years and that we ought to be able to obtain the information from the average consumption, and it speaks well for the work of the staff that there were only three cases of point-blank refusal out of over 20,000 consumers, and these cases were ultimately dealt with satisfactorily.

The analysis of the census cards was carried out by the clerical staff, the cards being filed in their respective rural areas and urban districts. The key analysis cards, ruled to allow for periodical revision, is in each separate drawer, all new connections being recorded on this "key" card. The information obtained has furnished some interesting detail and the extract given below of the types of domestic apparatus in general use, excluding the heavy-duty domestic apparatus which is, in the majority of cases, declared by the consumer or contractor prior to connection, indicates the remarkable unknown development that has been taking place.

"*All-mains*" *Wireless.*—It is well-known in the industry that a considerable number of wireless sets are installed without notifying the supply authorities, but the actual record of installed wireless sets as against notified installations shows a remarkable comparison; the approximate number notified slightly exceeded 4,000, whereas the total number revealed by census records was 14,389.

Electric Irons.—The approximate number of electric irons connected according to the records of the undertaking was slightly under 10,000; the census total gave the actual connections as 18,586.

Radiators.—The number of radiators declared as connected load was in the region of 7,000, whereas the actual number connected was 13,427.

Electric Kettles.—The approximate number of kettles connected was slightly nearer the actual number, but again in this instance there was a discrepancy of over 100 per cent. The number covered by previous notification was nearly 1,500 against 3,482 actually connected.

Vacuum Cleaners.—Over 5,000 vacuum cleaners were connected to the supply according to the prior records of the undertaking, whereas there are 8,738 actually connected.

The above figures are recorded as at March 31st, 1937, and the total number of domestic consumers on this date was 21,165.

When consideration was first given to the advisability of taking a complete census the work entailed appeared to be rather formidable, but now that the census has been completed the results bear witness to the necessity for such a survey and fully justify the amount of time expended in obtaining a correct record of the whole of the appliances actually connected to the supply mains of the Blackburn Corporation electricity undertaking.

I desire to tender thanks to Mr. R. H. Harral, A.M.I.E.E., engineer and manager of the undertaking, for permission to publish this report.

In the Courts

The E.T.U. and the London Committee

In the Chancery Division on July 13th Mr. Justice Luxmoore had before him the case of the Electrical Trades Union and others *v.* Nippress and others, the defendants being the officers of three branches of the Union, *viz.*, London North West, Press, and London East, on applications for interim injunctions against the defendants pending the trial of the actions.

Mr. Alexander Grant, K.C., in support of the applications, said that defendants had refused to give way as other defendants had done. The plaintiff union was a very large body having over 50,000 members. At the end of last year, when contracts were being carried out for the new Earl's Court building, there were a series of unauthorised strikes by a certain number of men who chose to take the law into their own hands. The Executive Council took the matter up with what was called the London Committee, which was a body of members selected from the various branches in London. It was that Committee which had taken the matter up and called the strikes instead of leaving them in the hands of the Union. The Executive Council expelled the members of the London Committee from the Union. All those members, he believed, had brought actions asking for a declaration that they had been improperly expelled. Meanwhile, various London branches of the Union were minded to support these members and had passed resolutions to the effect that until the Executive Council changed its mind and reinstated these expelled members they would not pay any contributions to the Union. In pursuance of resolutions they had proceeded to collect the contributions of members and to keep them in the hands of the branch treasurers or branch secretaries. The Union then commenced a number of actions. The branches now before his Lordship had passed resolutions to the effect that the contributions of members should not go into the funds of the Union but should be kept and used by the branches. They were refusing to contribute anything to the funds of the Union.

His Lordship: I cannot compel them to contribute to the Union but I can restrain people from collecting those subscriptions and not paying them into the Union.

Mr. Grant said that they should pay the money to the Union or cease to pretend that they were acting as a branch of the Union. The injunction asked for was to restrain the defendants until the trial from disposing of any contributions payable by members of the branches except by paying them into the Union's central bank account or as the Court should direct.

His Lordship asked Mr. Rewcastle, K.C., who appeared for the defendants, whether they would give an undertaking in the terms of the notices of motion as had been done in the other cases and pay the money into a separate account. Mr. Rewcastle said "No," as the case was entirely different.

Mr. Grant stated that the defendants were using the contributions to fight the Union and said that they were not going to pay any contributions until the Executive Council rescinded the resolution expelling the London Committee.

Mr. Rewcastle read an affidavit by Mr. W. J. Jackson, secretary of the London North-West Branch, stating that the branch had decided to start a private fund until such time as the London Committee was reinstated. In a circular sent out to the members it was stated that the London Committee gave its support to the members on strike at Earl's Court, who were endeavouring to maintain the clauses of the London

agreement. The Executive Committee, the circular proceeded, overruled the action of the London Committee and ended the strike in a most unsatisfactory manner. The branches had therefore decided that until the London Committee was reinstated the funds should be withheld from the Central Committee. In all other respects the branches would function normally and expenditure would be paid on the contributions received. They had made it plain that they would not receive anything for the Union and would not accept any contributions as Union contributions.

His Lordship, in giving judgment, said he did not think that at present the plaintiffs were entitled to the injunctions they sought, as defendants were not collecting anything for the Union. There would be no order on the motions except that the costs should be costs in the actions and the parties must proceed to trial.

Mr. Rewcastle said he understood that interim undertakings given by the defendants to pay the money they had received to their solicitors pending the trial was now at an end. His Lordship said that the motions had been heard.

On the same day Mr. Justice Luxmoore had before him an action brought by the Electrical Trades Union and others against Messrs. A. L. Turner, P. H. Cliburn and R. R. Redding, officials of the West London branch of the Union on a motion on behalf of the Union for interlocutory relief against the defendants pending the trial of the action.

Mr. Raymond Jennings, for the plaintiffs, said that the three defendants who appeared in person had agreed to treat the motion as the trial of the action and to submit to the following undertaking, *viz.*, to at once pay into the central bank of the Union all sums of money collected by them from members in respect of the contributions payable under the rules of the Union and not already paid into the account, except such sums as the Union might agree had properly been expended by the defendants on behalf of the Union. The defendants further gave an undertaking not to affix to the contribution cards any paper or writing not authorised under the rules of the Union and to pay the costs.

His Lordship asked the three defendants if they understood and agreed to give the undertakings which had been stated

The stand arranged jointly by E.D.A. and the Birmingham Electric Supply Department at the Royal Sanitary Institute Congress Exhibition now in progress at Bingley Hall, Birmingham

to the Court, and the defendants replied that they did. His Lordship therefore made the order as agreed and observed that the defendants might be able to make some arrangement to pay £17 17s., half the taxed costs, by instalments.

Parliamentary News (BY OUR SPECIAL REPORTER)

Electricity Policy

During the debate on July 9th on the Ministry of Transport Vote, Lt.-Col. Moore-Brabazon raised the question of electricity. He said that there were difficulties about this question, and although the Labour Party thought it would be well to nationalise the industry, there were strong local feelings about electricity. Many of the local authorities were against the bigger plan to nationalise. Distribution was, as everybody knew, much the more important part of electrical development in this country than generation and it cost more. That just because there were certain rumblings about the reorganisation of that side of electricity the Ministry should throw over the idea of a Bill, was a very sad affair. He hoped the Minister would remember that if he butted into electricity organisation he was taking on one of the greatest vested interests in this country, and that the Government if the board of directors were stockbrokers whose only outlook was the issue of more money, it was high time that these great works should pass to other hands. That was not true up and down the country, but there were glaring examples of it which would occur to the minds of everybody who knew about electricity in this country. It was high time that they grappled firmly with this thorny thistle again.

He was prepared to back the new scheme to the best of his ability.

The Television Service

On July 9th Mr. Hall Caine asked the Postmaster-General whether he was aware that it was proposed to close down the television broadcasting service for three weeks, in view of the fact that there was no possibility of providing holidays for the staff concerned without such action; and whether,

Dr. P. Dunsheath lecturing on "The Electron at Work and Play" at the I.E.E. Overseas Members' Conversazione last week **(See page 77)**

had taken them on before, had broken them and gone right through them, and set up a most astonishing organisation.

He could pledge the Minister that there were many members on the Government side of the House gravely dissatisfied with the state of electrical organisation to-day. There were some great power companies whose only view of electricity was what issues they could put upon the City, and it got to such a state the other day that one of the greatest of these electricity companies had to be forbidden by the Electricity Commissioners to make an issue because it was not wanted. Private enterprise was all right when one's heart was in the subject and one wanted genuinely to develop enterprise, but in view of the importance of developing this service, he was satisfied with adequate funds were available for it.

Major Tryon said that some weeks ago he approved a proposal made by the British Broadcasting Corporation and concurred in by the Television Advisory Committee that, with a view to facilitating certain structural alterations at the Alexandra Palace Station and to permit of an overhaul of the equipment, television transmissions should be suspended for a period of three weeks beginning on July 26th. The question whether the Corporation's income was adequate for the conduct of services entrusted to it, including the television service, was at present under consideration.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Radio Receivers

Many new radio receivers, both mains driven and battery operated, are being placed on the market this season by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. In the a.c. range are modestly priced table models; then there are the "All Wave 5" three-waveband superhet, an "All Wave Super 6" and an "All Wave Quality 8," with a 6-W push-pull triode output stage.

Two special receivers of unlimited range, the a.c. "All Wave 6" and the "Fidelity All Wave 8" are both four-waveband superhets for those who want the short waveband as well. There is also the "Transportable 5" superhet working from a self-contained aerial. Of radiograms there are the a.c. "All Wave Super 6" and the four-waveband "Fidelity All Wave 8" automatic record changer.

Two "universal" sets for the d.c. market are mains operated. Battery models include a three-valve receiver, and in the luxury class a four-valve three-waveband superhet, the battery "All Wave 4."

New Bulpitt Apparatus

Four new lines are announced by BULPITT & SONS., LTD., Camden Street, Birmingham. A convection heater, loaded at 1 kW, has a red lighting effect incorporated and is attractively finished in bronze. An effective cord grip, a stand round which the flex can be coiled when the iron is not in use, an easy-grip handle, and a hinged door to the terminal chamber are features of a new 5-lb. connectorless iron which is loaded at 550 W and is finished in chromium and bakelite.

A two-year guarantee is given with a new heating pad, which is fitted with four thermostats to prevent overheating. A three-heat control switch and a combination adaptor are provided. The loose cover is washable. A coffee set includes a 2-Pt. percolator with a horizontal ring-type element, the whole assembly of which is retained by means of one screw.

New Bulpitt appliances: The heating pad, iron and coffee set

A Redesigned Cleaner

A redesigned "Junior" Cleaner (Model 375) was introduced last week at the opening of Hoover House by HOOVER, LTD., Perivale, Middlesex. It is intended particularly for small homes and flats, and succeeds Model 370. It has an improved appearance, being finished in black and silver. Practically all of the parts which were in bright metal on the earlier model are now in black, while the main body of the cleaner has a black finish.

The new Hoover "Junior"

The new cleaner is even lighter than the previous one, and the motor is entirely encased in bakelite, the whole of the motor housing having been redesigned and lengthened so that the cleaner is much better balanced on the running wheels. Other features are modification of the lower left bag support giving greater ease in fixing, and a fixed type of main casting bottom plate which allows for the removal of the agitator without disturbing the plate. The cleaning tools remain the same as those of the earlier model and the motor still has a loading of 225 W. A milled nut enables the height of the nozzle to be varied rapidly according to the thickness of the pile.

The "Textophone"

The "Textophone," introduced by the E. SHIPTON CO., LTD., 12-15, Dartmouth Street, London, S.W.1, is a simple means of recording telephone conversations, and can also be used as a dictating machine. Speech is recorded on a drum of special steel wire which will record a conversation of twenty minutes' duration, the drive being by a synchronous motor.

A spare spool is provided with the apparatus which is usually accommodated in the typists' room, and the one control which is fitted on the principal's desk, consists of a small key box with five keys. These enable the controller to dictate, receive telephone messages, refer backwards or forwards, or stop at any part of the record. Revision automatically cancels previous dictation.

Two pairs of coils are arranged in the speech head. Each individual coil is provided with a guide slot for the core pressing against the steel wire under spring pressure. The pair of coils acting first on the steel wire by its cores is under the action of a direct current, which is of such intensity that the magnetism generated thereby is more powerful than that of the recording, thus erasing the entire recording. The second pair of coils is also passed by direct current. This current, however, is so directed as to reduce the strong magnetic recording of the first pair of coils. Besides, upon this second pair of coils are superimposed alternating currents which have been generated by the oscillations of the microphone diaphragm, thus responding with the rhythm of speech. These alternating currents influence the steel wire magnetically, leaving certain different magnetic recordings at each spot of the wire.

The wire moves from the right to the left coil, passing two pairs of magnets, one of them acting as erasing magnet, the other as speech magnet. The erasing magnet is fed with direct current from the power unit. The speech magnet is also fed similarly, but has super-imposed upon it the alternating current generated in the microphone.

For reproduction, the steel wire moves in the same direction along the cores of the twin coils as when recording. The pair of speech coils is connected to the telephone, either directly or across an amplifier. The steel wire which, like a permanent magnet, maintains its magnetism then acts in turn on the cores. These cores being thus magnetised in accordance with the magnetic impressions on the steel wire, the sounds which have been spoken into the microphone are reproduced in the telephone.

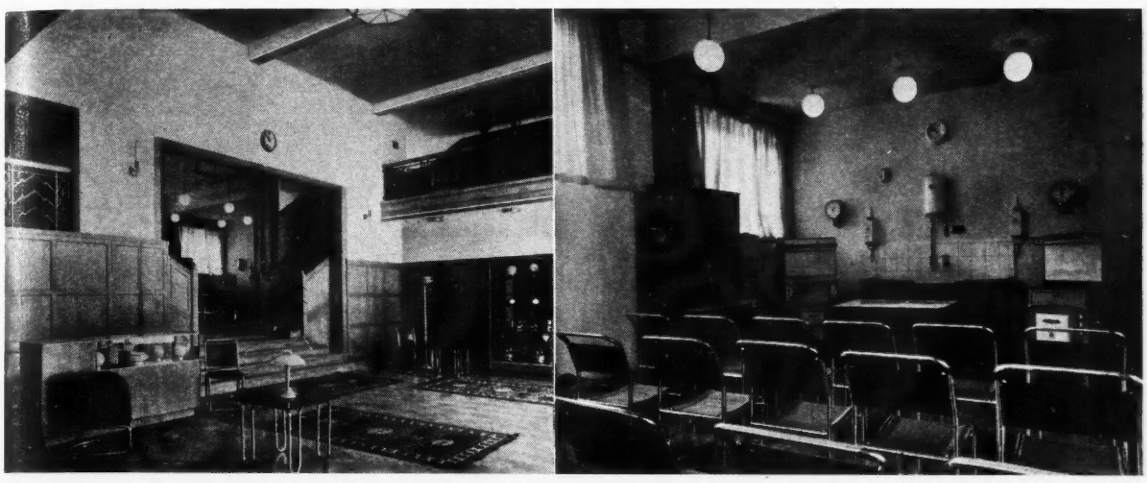
A combined table lamp and inkstand, and (right) a table lamp with a ball joint at the base enabling the light to be directly over any spot within a wide area. These have been introduced by Wilcox & Pitman, Ltd., Henrietta Street, Birmingham, 19

New Electricity Showrooms at Epsom

ON Saturday last the new electricity showrooms of the Epsom and Ewell Urban District Council were formally inaugurated by Mrs. Underhill, wife of Councillor J. S. Underhill (chairman of the Council). Councillor S. Smith, in welcoming the guests, referred to the rapid progress of the undertaking and said that in a district where the sales of electricity were largely for domestic purposes modern showrooms were necessary.

The Epsom undertaking commenced operation thirty-five years ago with plant of 110 kW capacity, and extensions were made from time to time until 1930, when a bulk supply was commenced from the London and Home Counties J.E.A. The plant at the works is now retained for standby purposes. For the first complete financial year the sales amounted to 84,950 kWh, and progress was slow until 1920. From that year the demand increased rapidly, and from 567 consumers in 1920 the figure rose to 5,313 consumers, with a total consumption of 8,963,500 kWh for the year ended March 31st last. The greater part of this progress has been made during the last seven years, and since the introduction of the "all-in" rate the sales have grown from 1,710,592 kWh, representing an increase in kWh per head of population of from 67 to 282. The average price per kWh sold has been reduced in the same period from 3.091d. to 1.50d. The introduction of a two-part tariff proved popular, and to-day 82 per cent. of the consumers take advantage of this method of charge, of whom 30 per cent. cook by electricity.

The new offices and showrooms occupy a prominent position, facing four important roads, and being at the junction of those roads with Epsom High Street. The showroom on the ground floor has two large display windows, while the facia, together with the façade, will be floodlighted. The main showroom is oak-panelled and fittings have been designed to conform with the general scheme of decoration. The building is 24 ft. in height, and use has been made of the available additional space by providing a mezzanine floor on which lighting fittings, &c., may be displayed. The balcony well is illuminated by means of architectural tubular lighting. From the showroom a wide opening gives access to the demonstration room with seating accommodation, where cooking demonstrations will be given. There is also a lighting bureau where various sight-testing displays are provided. The old building has been retained and the rooms converted into modern and well-ventilated offices. The lower ground floor is used as stores and an intake room for the supply, which is taken from the adjacent substation. On the second floor are situated the offices of the electrical engineer and deputy engineer, the remainder of the accommodation on this and the third floor being used by other members of the administrative staff. Each of these rooms has an inset electric fire. Thermostatically controlled water heaters are installed in the demonstration rooms and lavatories. The building, together with the alterations to the old premises, has been carried out by Sloggetts, Ltd., and has been constructed to the designs of the architects, Williams, Pettett & Gardner. The entire electrical installation was carried out by the Electricity Department under the supervision of Lt.-Col. H. W. Watts, the Council's electrical engineer.



The main showroom and the demonstration room of the new premises of the Epsom U.D.C. Electricity Department

Correspondence

Registration and Inspection

I am in full agreement with Messrs. T. G. Kelly and Alex. Milne who call for some immediate action. It is obvious that the genuine and legitimate contractor is losing ground every day to the "screwdriver and plier merchants," and it is time that some sincere effort was made to stop "cut prices" and "jerry work."

From my observations during the past few years I consider that many of the supply authorities are much to blame for the present chaos in the contracting industry. When the "big push" commenced a few years ago and assisted wiring schemes were inaugurated, many so-called contractors were allowed to be added to the supply authorities' contractors lists. I even know of young lads, with no more than a few months' training, trading as electrical contractors with their names on the contractors' list of their local supply authority, while many hundreds of their shoddy and unsafe installations have been connected to the main supply. What is the reason? Is it that our supply authorities are concerned with nothing but load development and do not wish to be bothered with the condition of the installations that are connected in so many premises to create that load?

As a member of the E.C.A. I suggest that the power is definitely within that body to clean up the contracting industry, if only all its members would pull their weight and a little bit more. I note that Mr. Milne suggests that first-class contractors find it difficult to make a living by working to a standard. I quite agree, but unfortunately that standard is only at present a voluntary one.

I should myself like to have seen many more paragraphs devoted to the contracting side of the industry in the McGowan Report, and it is a pity that the Government does not see its way clear to offer the public some guaranteed form of electrical safety in their homes and places of business, as well as providing pedestrian crossings.

As many writers have said on this page before, "Let us have action!" If it is any consolation to Messrs. Milne and Kelly and many other of my fellow contractors I may say that I am myself ready for action, so what about it?

Colchester, *July 10th*. E.C.A. CONTRACTOR.

Aerodrome Lighting

The British Standard Specification for land aerodrome and airway lighting (No. 563) has just been revised. Wherever international recommendations have been agreed by the International Illumination Commission these recommendations form the basis of the new specification. The chief modifications are to the arrangement of aerodrome obstruction lights and the provision of an automatic covering for all live parts of the boundary light immediately any of those parts are momentarily exposed after collapse of the boundary light. The flashing character of the aerodrome beacon has been more closely defined, and certain modifications have also been made to the specification for aviation colours. Copies of this specification (No. 563-1937) may be obtained from the Publication Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

American Illumination Convention

The Illuminating Engineering Society of America is holding its annual convention from September 27th to 30th at White Sulphur Springs, West Virginia.

Business and Industrial Notes

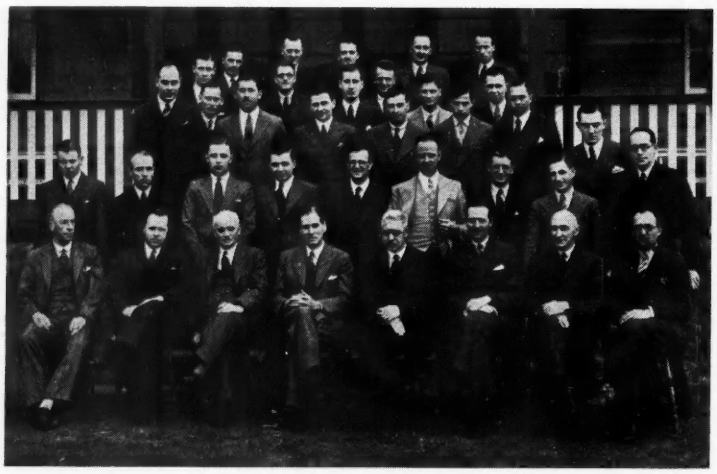
The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

The "Electrical Review" Index

The index to Vol. CXX of the ELECTRICAL REVIEW (January-June, 1937) is now available. Any reader who requires a copy may obtain one gratis from the Publisher, ELECTRICAL REVIEW, Dorset House, Stamford Street, S.E.1. Cloth binding cases may also be obtained at the price of 3s. 6d. each (3s. 10d. post free).

A Building Centre for Scotland

At a meeting recently convened by the Scottish Development Council for the purpose of discussing a proposal to establish a Building Centre in Glasgow Lord Elgin, president of the Council, presided. There was a very large representative audience of architects, manufacturers and others engaged in the building industry. Lord Elgin, in the course of his opening speech, said that one of the objects of the Development Council was to take the initiative and try to induce people to take an interest in the development of industry, trade, commerce and everything else which tended towards the welfare of Scotland and her industries. Mr. F. R. Yerbury gave a general description of the working of the London Building Centre and the extent to which it had grown since it started. He stated that during the year ended May 31st last the total number of visitors was 68,776 as against the previous year's total of 50,929, and that 97,000 technical inquiries had been dealt with. A resolution was carried recommending the Scottish Development Council to take immediate steps to establish a Building Centre in Scotland.



Members of the sales staff of the Midland Electric Manufacturing Co., Ltd., at the recent sales conference

Liverpool and Electrical Contracts

The Economy Committee of the Liverpool City Council has passed a resolution expressing the opinion that there is need in connection with the supply of transformers, switchgear and other electrical equipment purchased by the Corporation for genuine competitive tendering to be stimulated, and that with this object in view the Electric Power and Lighting Committee should be recommended to take into consideration the question of advertising or inviting tenders for future supplies of such equipment from foreign manufacturers, as well as from British firms.

I.F.S. Vehicle Lamp Quota

A first quota, and quota period, for the importation of electric filament lamps for vehicles into the Irish Free State was fixed last week, when an Order under the Control of Imports Act was made by the Government. This order has appointed the period July 26th to October 31st next as the first quota period, and has fixed the quota for that period at 17,000 articles of the description to which Control of Imports Order, 1937 (Quota No. 34) applies.

The Japanese Economic Mission

Lord Hirst, president of the Federation of British Industries, gave a luncheon on July 8th at the Savoy Hotel to welcome the members of the Japan Economic Mission which is visiting this country. In welcoming the mission Lord Hirst said that the economic relations of the two countries had grown up without any considered plan and under very different conditions. They both felt that their industrial policies must be designed to take care of the welfare of their people. Sensible people, however, did not nowadays go in for unrestricted competition, and in the desire to do the best for the workers in each country they must find a means of economic collaboration. He hoped, therefore, that the conversations into which the mission was about to enter would lead to a better understanding of individual problems and needs, and that some kind of plan towards friendly collaboration would emerge from them. Mr. C. Kadona, in reply, said they had come to England to pay a return visit for the mission which went to Japan three years ago under the auspices of the F.B.I. They hoped to improve their relations by personal contact and even if their talks did not produce immediate results, they hoped that they might be able to return to Japan with a feeling that they had done something to keep forward collaboration between the two countries.

M.E.M. Sales Conference

The Midland Electric Manufacturing Co., Ltd., held its annual sales conference on July 5th and 6th, when the whole of the M.E.M. representatives attended head office. The conference was opened on Monday morning by Mr. W. L. Barber, managing director and founder of the company, after which the representatives had their first opportunity of inspecting the new works at Tyseley. General discussions on sales problems occupied the remainder of the day, and in the evening the conference dinner was held. Technical matters were dealt with on Tuesday morning. After lunch the party, including a number of members of the head office staff, enjoyed a motor coach tour of the Cotswolds. The final event of an interesting and instructive conference was a visit to the Shakespeare Memorial Theatre at Stratford-on-Avon for a performance of *King Henry V.*

French Electrical Industry

The report of the Syndicat Général de la Construction Electrique states that as a result of the introduction of paid holidays and the forty-hour week the costs of production have been increased by between 50 and 75 per cent. The imports of electrical machinery and plant in 1936, according to the Customs reports, amounted to 89 metric tons valued at 258 million fr., as compared with 99 tons and 254 million fr. in 1935. It is considered that the present duties are quite out of date, and it is mentioned that in the first three months of 1937 the imports increased in tonnage by 44 per cent. and in value by 70 per cent.

North-West Midlands J.E.A. at Congleton

On July 5th the chairman, members and chief officials of the North-West Midlands Joint Electricity Authority paid a visit to the Congleton main sub-station and electricity showrooms. Luncheon was taken at the Bridge Hotel and the

The North-West Midlands J.E.A. at Congleton

Left to right: Councillor G. F. Barber, Mr. E. Mead (Met.-Vick.), Councillor L. Timmis, Mr. F. Favell, M.I.E.E. (chief engineer and manager, J.E.A.), Mr. H. Dart (committee clerk), Councillor H. Leason (Stoke), Mr. F. de B. Hart (Callender's), Councillor F. Dale (Congleton), Mr. E. Statham (accountant), Alderman H. Leese (chairman), Mr. J. Mee (assistant clerk), Mr. R. Bell, A.M.I.E.E. (borough electrical engineer, Congleton), Miss D. Norris, and Mr. M. D. Wilcocks (Callender's).

party proceeded to the sub-station, where an inspection was made of both the J.E.A. and the Congleton equipment. From there a visit of inspection was paid to the new electricity showrooms.

Insulation Resistance of Paint

A copy of a Faraday House report on two samples of paint submitted by Detel Products, Ltd., indicates the procedure

The new Hoover headquarters in Regent Street, W.

adopted for testing electrical qualities. Sheets of paper were dipped in the paints and dried in an oven at 55 deg. C. The insulation resistance in megohms per cm. cu. measured at 500 V between pieces of tinfoil pressed on the top and bottom surfaces was 3.05×10^8 for "clear Detel" and 5.50×10^6 for "red grade A Detel." An a.c. voltage (50 cycles) was applied to flat brass cylindrical electrodes and increased until breakdown occurred. The following average values were obtained from tests at several points on each sample: Clear, 11.8 kV (43.7 kV per mm.); red, 11.5 kV (54.8 kV per mm). Bakelite sheets were next coated with the paints and dried and graphite electrodes, ¼ in. apart and 4 in. long, were painted on each surface. After being subjected to an atmosphere of 90 per cent. relative humidity at 50 deg. C. for twenty-four hours the surface insulation resistance was 4.9×10^3 for the clear type and 6.8×10^3 for the red. For obtaining surface breakdown values, painted and dried bakelite sheets which had been immersed in water for two and seven days were compared with dry samples. An increasing a.c. voltage (50 cycles) was applied between brass cylindrical electrodes placed 1 in. apart on the surface. The dry clear sample flashed over at 20.5 kV and the red at 18.9 kV. The specimens that had been immersed for two days gave 20.1 and 18.85 kV and those immersed for seven days 19.27 and 20.3 kV. All samples withstood 18 kV for one minute after flashover.

Modern Sweden

We have received a copy of "Modern Sweden," published by the General Export Association of Sweden, Stockholm. This well-produced volume contains in its 500 pages a fund of information and numerous illustrations of various features of the country, its institutions and industries. There is an interesting chapter on the Swedish electrical industry, while brief particulars of the activities of some of the more important export manufacturing companies are included.

New Hoover London Headquarters

On Wednesday of last week the new London sales headquarters of Hoover, Ltd., at Hoover House, 213, Regent Street, W.1, was opened to the public. The window display comprises the various models, together with the Royal coat of arms, the Roger Field gold medal and photographs of the *Queen Mary*, in which Hoover cleaners are used. In the centre is a large volume entitled "The Story of Hoover, Ltd.," the pages being turned over automatically. Tasteful modern design characterises the interior of the building, with its bleached and natural pearwood forming the basic contrasting colours in the panelling. Sectional and complete models of the cleaner are on view.

Parents' Day at the B.T.H. Works

Last Saturday afternoon the British Thomson-Houston Co., Ltd., entertained the parents of the apprentices at its Willesden works on the occasion of the annual "Parents' Day." Following a tour of the works which included demonstrations in the high-voltage test laboratory, electric welding and flame cutting, the party adjourned for tea, followed by the speeches. The chair was taken by Mr. T. Hands, works manager, and Mr. H. Trencham, consulting switchgear engineer, commented on the Easthope essay competition, the awards being presented by Mrs. H. N. Sporborg, wife of the chief engineer of the B.T.H. Co. Mr. Sporborg said that the competition was inaugurated by Mr. Easthope, formerly manager of the Willesden works, in 1931. It was with regret he had to announce his death at the close of 1936. Tribute was paid to his continual interest in young people. He was widely read and appreciated good literature and therefore wanted the young engineers to learn to express themselves, for no other profession required more logical thinking and concise expression. He wanted them to broaden their mental horizon to embrace subjects beyond the field of pure engineering. A vote of thanks was proposed by Mr. G. E. Riley (manager, Switchgear Sales) and seconded by the vice-president of the Apprentice Association. Mr. F. A. Parker (apprentice supervisor) announced a vote of thanks to Mr. Hands, proposed by a parent and seconded by Mr. Reid (Paddington Technical Institute). Mr. Parker said that there were 115 trade apprentices and 71 in the drawing office, 148 being members of the Apprentice Association. A speech by Mr. Worth concluded the proceedings.

Social Events

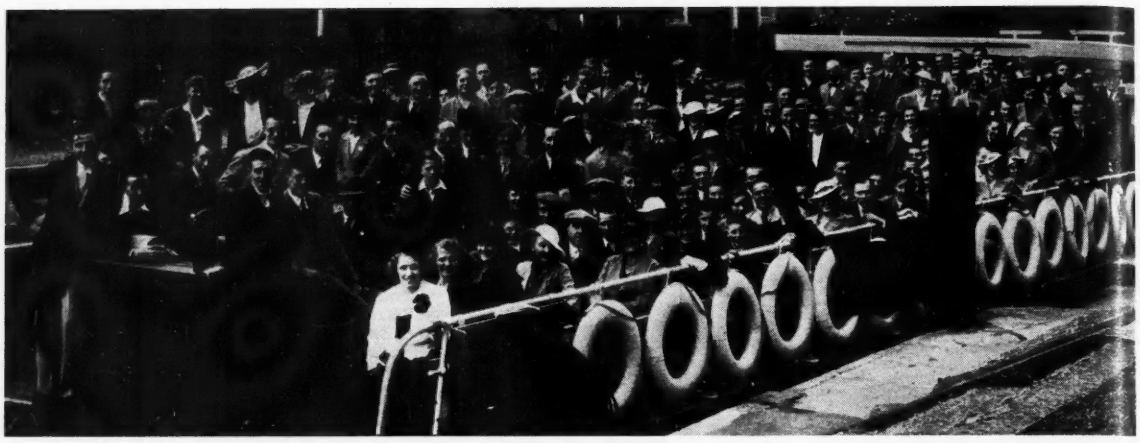
The second annual sports gala day was held recently by M.C.L. & Repetition, Ltd. The opening ceremony was performed by Mrs. J. E. Naismith, the wife of the managing director. The event was favoured with good weather, and a full programme of thirty athletic events was completed, these being followed by dancing, whist drives, &c. In addition, there was a variety of side-shows.

The English Electric Co., Ltd., held its inter-works social and athletic meeting, of which Mr. G. H. Nelson (chairman and managing director of the company) is president, at Stafford on July 3rd, nearly 1,500 employés from the company's Bradford, Rugby and Preston works making the journey. Over 4,000 people were assembled on the sports field.

A group at the English Electric sports showing seated (left to right): Mr. J. G. Stuart (chief accountant), Mrs. A. D. Sloan, Mr. C. Hollander (commercial manager), Mrs. J. Rogers, Mr. J. Bissett (general manager of works), Mrs. G. H. Nelson, Mr. G. H. Nelson (chairman and managing director), Mrs. J. Bissett, Mr. J. Rogers (general manager, Stafford), Mrs. C. Hollander, Mr. A. D. Sloan (chief engineer), and Mrs. J. G. Stuart

On arrival at Stafford visitors were given light refreshments and then conducted through the works. Later, lunch was provided in the works canteen and in a marquee specially erected for the day. The sports were declared open by Mr. J. Rogers, general manager of the Stafford works. In addition to the Aggregate Cup and the Mensforth Shield for Athletics, fourteen cups were awarded. Mrs. J. Rogers presented the prizes.

The staff of the Birmingham works of Berry's Electric, Ltd.,



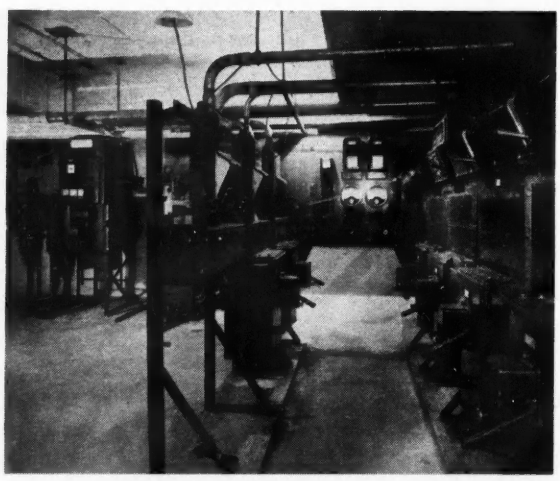
The Birmingham works staff of Berry's Electric, Ltd., on the Thames at Windsor during their recent annual outing

held their annual outing recently when a launch was chartered to take the party from Marlow to Windsor. After a conducted tour of Windsor Castle and lunch the party was conveyed to London, the day concluding with a visit to a theatre.

A sports meeting between the Yorkshire Electric Power Co. and the Lancashire Electric Power Co. was held on July 3rd on the grounds of the Otley Mills Club by permission of Wm. Ackroyd & Co., Ltd., and Duncan Barraclough & Co., Ltd. The teams were entertained to lunch, Mr. W. B. Woodhouse, managing director of the Yorkshire Electric Power Co., welcoming the guests and Mr. C. D. Taite, engineer and manager, suitably replying on behalf of the Lancashire Electric Power Co. The rivalry between the companies extended to cricket, bowls and tennis, and the Yorkshire Electric Power Co. was successful on all "counts." Mr. Stansfield (secretary) and Colonel H. C. Fraser, of the Yorkshire Electric Power Co., and Messrs. R. C. Leslie, Rix and Bridge, of the Lancashire Electric Power Co., were among those present.

Orders Recently Booked

Not less than twenty-five miles of cable and 950 lamps which were used in the recently opened Dunedin (N.Z.) £350,000 Post Office were supplied through the New Zealand agents of



General view of the main Crompton Parkinson switchgear at the Dunedin Post Office

Crompton Parkinson, Ltd., who also manufactured the substation equipment and main switchgear, comprising a type "A" 6,600 V ring main unit; an m.c.a. unit with TB. 13 breaker, rupturing capacity 50,000 kVA; a 300-kVA B.E.T. transformer; and a 500-A "Klad A" pillar. This equipment is connected by metal trunking to form a combined switchgear and transformer unit. The power section consists of two 200-A "Klad B" units with three 100-A switch-fuses. The lighting and heating section incorporates five 200-A "Klad B" units with 200-A switch-fuses. Interconnection of the two sections is by a bus-bar chamber surmounted by a metering panel.

A contract for the resignalling of York Station has been awarded by the London and North-Eastern Railway Co. to the Westinghouse Brake & Signal Co., Ltd. This installation will be of the relay interlocking type, operating approximately 900 routes, and will cover the whole of York Station, extending from Chaloners Whin Junction to Poppleton Junction. The contract includes the supply and fixing of a large number of multi-unit colour light and position light subsidiary signals, and approximately 300 point layouts, for which, as in the case of Leeds New Station, the Railway Co. has selected electro-pneumatic operation.

Marryat & Scott, Ltd., have received a contract for the installation of two high-speed passenger lifts and an electric motor car lift for the Royal London Mutual Insurance Society, Ltd., in the new extension at Worship Street, London, E.C. The work is to be done under the direction of Mr. J. J. Joass, architect, the consulting engineer for the installation being Mr. J. F. Farquharson.

Following recent orders for "Brush-Ljungstrom" turbo-alternator sets from Grimsby and New South Wales the Brush Electrical Engineering Co., Ltd., has received a repeat order through its agents, William Jacks & Co. (Malaya), Ltd., for a 1,500-kW set for the Rawang Tin Co., Federated Malay States. This order has been given in view of the excellent performance of a 1,500-kW set installed in 1923 and a 3,000-kW set installed in 1927. In the Federated Malay States "Brush-Ljungstrom" turbo-alternators with a total output of over 20,000 kW are installed.

With reference to the note which appeared under this heading in our last issue relating to the dispatch of Revo lanterns to South Africa, Philips Lamps, Ltd., informs us that "Philora" 400-W mercury lamps and control gear will be used on the entire installation.

The Troon Council has decided to heat the dressing rooms at the Troon swimming pool. A 60-kW Bastian & Allen electrode boiler will be used for this purpose, electricity being taken from the Ayrshire Electricity Board. The installation work will be carried out by James Combe & Son, Ltd.

Annual Holidays

The works of British National Electrics, Ltd., will be closed for the annual holidays from mid-day July 16th until July 27th.

The Luton works of the Jackson Electric Stove Co., Ltd., will be closed from July 30th to August 9th.

Rotunda, Ltd., is closing its Denton works from July 30th to August 9th.

The Charlton works of Johnson & Phillips, Ltd., will be closed from July 31st to August 9th.

Trade Announcements

The telephone numbers of the Bristol and Gloucester branches of the General Electric Co., Ltd., have been changed. The new numbers are Bristol 24551 and Gloucester 3017.

An opportunity has occurred for Joseph Lucas, Ltd., to purchase the shareholding in C.A.V.-Bosch, Ltd., of Acton, previously held by Robert Bosch of Stuttgart, and they now entirely own this company. The agreements between Lucas, C.A.V.-Bosch and Robert Bosch remain exactly as hitherto and the facilities for full interchange of patents, together with all engineering experience, will be continued.

Rowlands Electrical Accessories, Ltd., wish to express regret for any delays in delivery while they have been occupied in removing the Assembly Section of their works from Hockley Hill to their new factory in Devonshire Street, Birmingham, 18.

Britannia Electric Lamp Works (1934), Ltd., has obtained the sole distribution for Ingraham electric clocks for the British Isles.

The new London office of Harcourts, Ltd., is Stanhope House, 1, Kean Street, Aldwych, W.C.2. The company has opened a new showroom in adjacent premises, Crown House, Aldwych, W.C.

Milne & Longbottom have purchased land adjoining their

present factory in Rochdale, and plans are being prepared for extensions to their works and offices.

Dutch Radio Exports

The returns of the Statistical Bureau show that the exports of radio apparatus from Holland increased from 623 metric tons in May to 901 tons in June, as compared with 401 tons in June, 1936. The value of 4,217,000 fl. in June was the highest since January, when it amounted to 4,322,000 fl. The total value for the half-year was 21,448,000 fl., as against 34,437,000 fl. for the whole of 1936. The exports of filament lamps also increased in June; the total value in the first six months was 3,638,000 fl., as against 5,583,000 fl. for the whole of 1936.

Joint Electricity Authorities and Boards

We have received a copy of the report for the year ended June 30th last of the Conference of Joint Electricity Authorities, Joint Advisory Boards and Joint Committees from the hon-secretary, Mr. Leslie Gordon.

In the course of this reference is made to the proposal to hold a national electrical exhibition in 1938 with which the Conference has concurred in principle. Ald. Dudley Stuart (London J.E.A.) has been appointed to represent the Conference on the exhibition committee. Matters arising out of the Electricity Supply (Meters) Act, 1936, were discussed with the Electricity Commissioners and the Conference's views on the Government's distribution proposals were submitted to the Ministry of Transport.

Proposals have been submitted to the Electricity Commissioners by the Conference in favour of the amendment of the Joint Electricity Authorities (Borrowing Power) Regulations, 1926, and Joint Electricity Authorities Stock Regulations, 1927, designed to enable joint electricity authorities to establish and administer consolidated loans funds. The Conference proposes to consider suggesting to the Ministry of Transport and to the Electricity Commissioners that provision should be made in the next general Electricity (Supply) Bill that securities of joint electricity authorities shall be statutory securities, and that the list of trustee investments shall be extended by the addition of the stocks and other financial issues of joint electricity authorities, when the Bill is introduced into Parliament.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price. July 14th.	Fortnight's Inc. or Dec.
a Acid Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal) ... „	£18 10s.	—
a Borax ... ... „	£17	—
a Copper, Sulphate ... ... „	£15 10s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a „ Perchlorate ... ... „	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur, Commercial ... ... per ton	£11	—
a „ Roll ... ... „	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a „ Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b „ Wire ... ... per lb.	1/1 to 1/9	—
b „ Sheet and Foil ... ... „	1/3 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£244	£7 inc.
Grade II ... ... „	£169	£4 inc.
Grade III ... ... „	£90	£2 inc.
c Brass (rolled metal 2" to 12" basis) ... per lb.	9¾d.	¼d. inc.
c „ Tubes (solid drawn) ... ... „	1/0½ to 1/0¾	—
c „ Wire, basis ... ... „	9¾d.	¼d. inc.
c Copper Tubes (solid drawn) ... „	1/2¼d.	—
g „ Bars (best selected) ... ... per ton	£93	—
g „ Sheet ... ... „		
g „ Rod ... ... „		
d „ (Electrolytic) Bars ... ... „	£64	£2 inc.
d „ „ Wire Rods ... „	£68	£1 inc.
d „ „ H.C. Wire ... per lb.	9¾d.	¼d. inc.
f Ebonite Rod ½" dia. & up ... ... „	1/10 to 2/9	—
f „ Sheet ⅛" thick & up ... „	1/7 to 1/10	—
n German Silver Wire, Nos. 1 to 12 ... „	2/5	—
h Gutta-percha, fine ... ... „	nom.	—
h India-rubber, Para-fine ... ... „	10d.	—
i Iron, Pig (Cleveland, No. 3) ... per ton	£4 5s. 0d.	—
i „ Wire galv. No. 1, P.O. Qual. ... „	£23	—
g Lead, English Pig ... ... „	£26 15s.	£1 10s. inc.
g Mercury ... ... per bot.	£15 1s.	4s. dec.
e Mica (in original cases) small ... per lb.	10d. to 2/–	—
e „ „ „ medium ... „	6/– to 12/6	—
e „ „ „ large ... „	13/– to 17/6 up	—
p Phosphor Bronze, plain castings ... „	1/3½	—
p „ „ drawn bars & rods „	1/3¾	¼d. inc.
p „ „ rolled strip & sheet „	1/1¾	¼d. inc.
p „ „ wire ... ... „	1/3¾	¼d. inc.
o Platinum ... ... per oz.	£10	—
d Silicium Bronze Wire ... ... per lb.	10 ½d.	¼d. inc.
g Spelter ... ... per ton	£22 16s. 3d.	£1 6s. 3d. inc.
r Steel, Magnet, in bars ... ... per lb.	7¾d.	—
g Tin, Block (English) ... ... per ton	£266 10s.	£13 inc.
n „ Wire, Nos. 1 to 16 ... ... per lb.	4/3	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

Industrial Law Lectures

The Industrial Welfare Society is holding a lecture course on industrial law at the headquarters of the Society, 14, Hobart Place, Westminster, S.W.1, commencing on October 4th. The course is intended for all persons engaged in executive work in industry and commerce, as well as for persons intending to take up such posts. The fee for the course is £2 2s. (executives of member firms £1 12s. 6d.), and application for enrolment should be sent to the Secretary of the Society, from whom further particulars can be obtained.

A Coventry Guide

The official handbook of the City of Coventry which we have just received contains a record of the industrial, commercial, municipal and social activities of the city, and sets forth the advantages of the city as a place for the establishment of new industries and as a place of residence. There are chapters on the public utility services, including one outlining the progress of the Electricity Department. The handbook is well produced and contains many illustrations.

Change of Name

Trevithick Weld, Ltd., 4b, Frederick's Place, Old Jewry, E.C.2, has changed its name to Aberdare Cables, Ltd.

New Catalogues and Lists

Dominion Electrical Co., 160, New Cavendish Street, London, W.1.—A leaflet describing "Silverice" balls used in the same way as ice for cooling drinks.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A catalogue of enclosed lighting fittings and "Gecoray" reflectors.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, London, W.1.—Details of the new season's radio receivers.

Harcourts, Ltd., Stanhope House, Kean Street, London, W.C.2.—An illustrated art catalogue of lighting fittings.

Genristo, Ltd., Osmaston Street, Nottingham.—A catalogue of electric heating elements of all kinds.

Bankruptcy Proceedings

E. Weston (trading as Weston Electrical & Radio Service), 41, Upper Marylebone Street, London.—The receiving order was made at the London Bankruptcy Court on a creditor's petition, and one June 26th the debtor was adjuged bankrupt. The first meeting of creditors was held on July 7th when accounts were submitted showing liabilities £700, against assets £32. Insolvency was attributed to bad debts in connection with the radio side of the trading, combined with loss on electrical contracts. The case was left in the hands of the Official Receiver to be wound up in bankruptcy.

C. J. Tann "Brianscot," Station Road, Wootton, Isle of Wight, previously carrying on business in partnership with another at 87, High Street, Newport, I.O.W., radio engineer.—This debtor filed his own petition and at the first meeting of creditors held recently at the Official Receiver's Office, 87, High Street, Portsmouth, the case being a summary one was left with the Official Receiver as trustee. The statement of affairs showed ranking liabilities of £568 and net assets of £214, leaving a deficiency of £354.

S. D. Bennett, electrical engineer, 2, Burnt Ash Parade, Lee, London.—Public examination July 27th at the Court House, Burney Street, Greenwich, S.E.

A. H. Estall, electrical contractor, 20, Thackeray Street, Kensington, W.8.—Application for discharge to be heard on July 28th at Bankruptcy Buildings, W.C.

D. C. Hayes (Streetsbrook Electrical Co.), electrical contractor, 195, Bromsgrove Street, Birmingham.—Trustee, Mr. C. Hoult, 159, Great Charles Street, Birmingham, Official Receiver, released June 24th.

A. E. Cowee, radio and electrical engineer, 113, Mount Pleasant Road, Tottenham, N.17.—First and final dividend of 1s. 6d. in the £, payable July 21st at 29, Russell Square, W.C.1.

J. L. H. Graham, deceased (West Yorkshire Crystal Lamp Co.), electric lamp merchant, formerly of 109, Thornton Road, Bradford.—Trustee, Mr. W. F. Cresswell, 71, Manningham Lane, Bradford, Official Receiver, released June 30th.

T. Mehew, electrical engineer, Victoria Road, Netherfield, Nottingham.—First and final dividend of 2s. 2d. in the £, payable July 20th at 22, Regent Street, Park Row, Nottingham.

Company Liquidation

Newmode Electric Appliances, Ltd.—Meeting August 9th at Crown House, Aldwych, W.C.2. to receive an account of the winding-up by the liquidator, Mr. C. Collins.

Meeting of Creditors

London Electric Appliances, Ltd.—Meeting of creditors July 16th at Cannon Street Hotel, E.C.

Dissolution of Partnership

Hilton & Co., electrical contractors, 13, Nile Street, Burslem, Stoke-on-Trent.—The business carried on by Messrs. J. Hilton and A. Woodfint has been determined by mutual consent. Mr. Woodfint will attend to debts.

Private Arrangement

A. W. J. Saunders, trading as Chelsea Radio 111, Cheyne Walk, London, S.W.—The creditors herein met recently when the statement of affairs disclosed liabilities of £704. The assets, after allowing £16 for preferential claims, were £127, showing a deficiency of £576. The debtor attributed his position to the conditions in the immediate neighbourhood and loss on hire-purchase transactions. It was decided that the matter should be dealt with under a deed of assignment to Mr. C. H. Appleby, C.A., Aldwych House, W.C.2, with a committee consisting of the representatives of Corfield & Cripwell, Brown Bros., Ltd., and Marconiphone, Ltd.

Electricity Supply

Lighting, Domestic, Power

Alford (Aberdeenshire). — ELECTRIC LIGHTING. — The Grampian Electricity Supply Co. has decided to extend the supply from Kemnay to Alford on the understanding that it will be given the contract for street lighting by the County Council. The Property and Works Committee has recommended the wiring of the Council houses.

Australia.—EXTENSION SCHEME APPROVED.—A referendum of property owners at Albany (W.A.) on a proposal of the Council to raise a loan of £16,500 for the purpose of electricity extensions resulted in a decisive majority in favour of the project. The tender of William Adams & Co., Ltd., Perth, of £13,000 for new plant has since been accepted.

REASON FOR "PEAK."—For some years there has been a sudden rise in the demand for electricity at Canberra at 11 o'clock each morning, and this "peak" has been increasing steadily. It has now been traced to the public offices, where at 11 o'clock women employés prepare morning tea for practically the whole of the office staffs. The city has no gas, and the use of hundreds of electric kettles at this time creates the greatest demand for electricity in the whole twenty-four hours.

Bacup.—CONCESSIONS.—The Electricity Committee has reduced its charges. The flat rate for domestic and business premises is now 4½d. instead of 5d. per kWh. Concessions are also made in respect of the "all-in" domestic rate and to small power consumers

Barking.—A SUCCESSFUL YEAR.—Satisfactory progress from the points of view of output, decreasing costs, reduction in prices and lower percentage of outstanding debt to capital expenditure is reported for the past year. Mr. W. E. Kidner, the borough electrical engineer, states that sales rose by 18 per cent. to 19.7 million kWh. The net profit was £18,682, against £13,915 in the previous year, the average price obtained per kWh being 1.282d. (1.344d.). The hire of water heaters was commenced last August, and by March 31st 198 had been installed. During the year a scheme for the reorganisation of the area to the north of the L.M.S. Railway (Tilbury Section) was put in hand; the supply for the L.P.T.B. trolley-bus services was designed and approved, completion of the change-over was decided upon, and the Public Health and Maternity Committee decided to make provision for domestic electrical apparatus in all property to be erected.

Bath.—ELECTRICITY ACCOUNTS.—These show that the revenue of the Electricity Department for the past year was £175,406, against £166,341 in the previous year, the gross profit being £48,873 (£57,820) and the net profit £15,732 (£26,881). A sum of £7,000 is being contributed to the rates, the first so allocated since 1926

Berwick (Northumberland).—SUB-STATIONS.—The Scottish Southern Electric Supply Co., Ltd., proposes to erect sub-stations in North Road, Berwick; Osborne Road, Tweedmouth; and at Tweedmouth Mount Farm.

Blackpool.—ASSISTED WIRING SCHEME.—The Housing Committee has asked the Electricity Committee to consider the adoption of an assisted wiring scheme to provide for the installation of electric lighting in Corporation houses on the South Shore estate.

ELECTRIC PUMPS.—Tidal flaps and electrically driven centrifugal pumps are to be provided by the Electricity Committee at the Anchorsholme Lane pumping station at a cost of £790.

Bolton.—SUBSTANTIAL SURPLUS.—Including £12,382 in respect of C.E.B. adjustment for the calendar years 1934 and 1935, the gross profit on the past year's working of the Electricity Department (electrical engineer and manager, Mr. H. E. Annett) was £104,995, against £72,303 in the previous year. The net profit was £60,287 (£32,669), to which is added the credit balance brought forward (£129,810). A sum of £10,000 is allocated in aid of the rates (making £178,733 since the inception of the undertaking) and £21,456 to capital outlay, leaving a balance of £158,641 to be carried forward. The total income is given as £389,968, against £346,208 in 1935-36. The inclusive cost per kWh sold was 0.787d. (0.818d.) and the average price obtained 0.93d. (0.95d.). Sales of energy totalled 96.4 million kWh, an increase of 9.5 million kWh (11 per cent.), the load factor being 34.02 (31.07) per cent.

Buckie.—LOWER CHARGES.—A special meeting of the Town Council recently agreed to a recommendation of the Electricity Committee regarding prices. The ordinary rate is to be 5½d. instead of 6d. per kWh, and the domestic two-part tariff "unit" charge is to be reduced from ¾d. to ½d. during the summer months. In addition power charges are to be lowered.

Cardiff.—ELECTRICITY FOR FLOODLIGHTING.—The Electricity Committee is to charge a flat rate of 2d. per kWh for electricity used for the exterior floodlighting of premises.

STREET LIGHTING.—An estimate for the conversion of the existing gas lighting in the city to electricity and also the charge which the Electricity Committee would make for energy supplied for street-lighting purposes in the case of complete electric lighting are being placed before the Finance Committee.

Chesterfield.—STREET LIGHTING.—The Corporation has approved estimates of £1,500 for lighting Chatsworth Road and West Barrs.

Clacton-on-Sea.—PROGRESS OF UNDERTAKING.—The increase in energy sold by the Electricity Department for domestic purposes during the past year was equivalent to 54 per cent. The average increase of all supplies was 20 per cent., the total sales being 5.7 million kWh. With regard to the financial side, Mr. G. Broadhurst, the electrical engineer and manager, recalls that reductions in charges came into force as from the March quarter meter readings last year. There was a gross profit of £22,624 and a net deficit, after meeting loan charges, &c., of £315.

Colchester.—LOAN.—Application is being made by the Town Council for sanction to a loan of £2,020 for extra-high-voltage works at Goldhanger and Tolleshunt Major, and £4,005 for works at Walton-on-the-Naze.

Conway.—CONSUMERS TO BENEFIT.—The Council has made concessions in electricity charges to the value of approximately £1,500.

Coventry.—ELECTRIC-DISCHARGE LIGHTING.—A number of 250-W electric-discharge lamps have been installed in White Street and Jesson Street, and similar lighting is to be provided in Foleshill Road.

Croydon.—RESIDENTIAL SCHOOL INSTALLATION.—The L.C.C. Education Committee is to proceed with the installation of electric lighting to replace the existing gas lighting at Shirley Residential School. Croydon Corporation will provide a high-voltage supply to a sub-station to be built near one of the entrance gates. The proposed work comprises the provision of a cable system between the sub-station and the various buildings, road lighting and electrical installations in the buildings. The estimated cost is £7,500.

Dewsbury.—HIRE OF TIME SWITCHES.—The following annual charges for the hire of time switches have been adopted by the Town Council: 10 A, 10s.; 25 A, 14s. 6d.; 50 A, 25s.; 100 A, 30s.; 200 A, 35s.; and 300 A, 50s.

Epsom and Ewell.—DEPARTMENT'S ACCOUNTS.—There was a gross profit of £20,558 on the past year's working of the Electricity Department, the total revenue being £70,284. The net profit was £1,917. The average price per kWh sold was 1.423d., against 1.526d. in 1935-36, excluding supplies for public lighting. The electrical engineer is Lieut.-Col. H. W. Watts.

Fareham.—STREET LIGHTING.—The Urban District Council has approved a recommendation by the Lighting Committee to carry out a scheme of street lighting at an estimated cost of £6,200, and it is proposed to apply to the Electricity Commissioners for authority to use the reserve fund and surplus revenue of the electricity undertaking to cover the cost of the scheme.

Grimsby.—IMPROVED LIGHTING.—For improving the lighting of Freeman Street 181 Revo "Magnalite" silvered mirror fittings equipped with 300-W gas-filled lamps have been installed. These are in staggered formation, 24 ft. 6 in. high, and at intervals of 180 ft. The illumination is even and visibility excellent.

Herne Bay.—INQUIRY INTO CHARGES.—An inquiry into the charges of the Herne Bay Electricity Supply Co., Ltd., was held by the Ministry of Transport on July 6th arising out of a petition by the Herne Bay Ratepayers' Association. The latter body asked for a reduction of the maximum charges for electricity, which are at present 8d. per kWh. for lighting and 4d. for power, and suggested that the charges should be 5d. per kWh for lighting and 3d. for power.

Huddersfield.—REDUCED CHARGES.—The Council has decided upon various reductions in electricity charges. For domestic consumers the alternative charge is to be ½d. per kWh for the first 240 kWh. Discounts will be increased from 5 to 7½ per cent.

Ipswich.—LARGE INCREASE IN DOMESTIC SALES.—Under the combined lighting, heating and cooking tariff consumption increased by 28 per cent. during the past year, both this and the actual expansion (3.1 million kWh) being in excess of other increases. Mr. H. E. Blackiston, the chief engineer and manager, observes that there is no doubt that the showrooms and offices at Electric House continue to be a great convenience to the public. Previously the showrooms were at times very congested, but greater space has recently been made available on the ground floor. The installation department has continued to make splendid progress, the income being up by £4,532 to £21,411. A considerable part of the 7,514 kW represented by the 20,546 orders executed during the year consisted of additional apparatus installed in premises already taking a supply, thus increasing the revenue per consumer. Total sales rose by 17 per cent. to 51 million kWh and consumers by 2,058 to 22,624. Income was £253,549 (against £224,142) and expenditure (including loan charges, &c.) £219,283 (£194,752), leaving a surplus of £34,266.

EFFECT OF TWO-PART TARIFF.—Discussing the reductions in charges made last year, Mr. Blackiston states that these have the appearance of niggardliness in comparison with the spectacular reductions of previous years. Actually, the two-part tariff terms provided their own reductions, and 80 per cent. of the energy sold came within this class.

Lancashire.—INQUIRY.—Mr. W. J. Hadfield, an inspector of the Ministry of Transport, has conducted an inquiry into the

objections by the West Lancashire Rural District Council and the Lancashire County Council to the plans submitted by the Lancashire Electric Power Co. for the erection of overhead lines at Bickerstaffe. The objectors were against the practice of disfiguring the countryside with poles, while for the Power Co. it was stated that in this particular case it would be distinctly uneconomic to lay underground cables. The inspector visited the area.

Lincoln.—EXPANDING SALES.—Following an increase of 31 per cent. in domestic supplies of electricity in 1935-36 a further improvement of 24 per cent. is recorded for the past year. Total sales rose by 10 per cent. to 28 million kWh, the number of consumers increasing by 1,769 to 12,585. Connections rose from 36,385 kW to 40,512 kW and the maximum load from 8,248 kW to 9,144 kW, the load factor falling from 37.8 to 37.2 per cent. With regard to generation at the St. Swithin's power station, Mr. F. Newey, the city electrical engineer and manager, points out that the average price of fuel increased by 22 per cent. It is noted that prepayment meter collections rose from £19,804 to £24,938. The gross profit was up by £5,217 to £35,254, but the net profit at £2,097 was down by £7,354, there being an increase of £12,571 in debt charges and income-tax.

Loddon.—NO OBSTRUCTION TO SUPPLY PROJECT.—A proposal of the Yarmouth Corporation to erect an overhead line at Ditchingham was recently discussed by the Rural District Council. It was moved that the Corporation should be asked to place the cable underground, but this was defeated. The chairman said that they should be careful not to do anything to hinder the public obtaining an electricity supply.

London.—FLOODLIGHTING.—The London County Council Parks Committee is to floodlight the children's gymnasium and playground at Eel Brook Common at a cost of £860. The Education Committee reports that last winter two playgrounds, one at St. Paul's Road School, Limehouse, and one at Springfield School, Kennington, were floodlighted in the evenings for organised games. The arrangements proved successful, and it is proposed to include the boys' playground of the Senior Street School, Paddington, next winter.

Loughborough.—CHEAPER ELECTRICITY.—The profit on the electricity undertaking for the past year, amounting to £6,700, is to benefit consumers, and decreased charges are to take effect soon.

Luton.—PERMISSION TO ERECT OVERHEAD LINES.—The Town Council has received the consent of the Minister of Transport to the erection of overhead lines at Eggington, Kensworth, Eaton Bray and Whipsnade.

Maesteg.—LOWER CHARGES.—Reductions in the price of electricity were approved by the Urban District Council at its recent meeting. These take effect as from April 1st last and include 1½d. per kWh off the rate for slot-meter users and a 20 per cent. rebate for ordinary consumers providing they pay their accounts within a stipulated time.

North Cotswold.—INQUIRY INTO CHARGES URGED.—The Rural District Council has passed a resolution supporting the decision of the Evesham R.D.C. to ask the Ministry of Transport to hold an inquiry into the charges of the S.W. & S. Electric Power Co., with an addendum that the attention of the Minister should be drawn to the high contributions demanded from consumers towards the capital cost of extensions.

Northern Ireland.—GENERATION OF ELECTRICITY.—A Ministry of Commerce return shows that 49.8 million kWh of electricity was generated by authorised undertakings in Northern Ireland during the quarter ended June 30th last, as compared with 43.3 million kWh in the corresponding quarter in 1936, representing an increase of 6.5 million kWh, or 15 per cent. The total quantity of electricity generated during the first six months of 1937 was 114.4 million kWh, as compared with 101.5 million kWh for the corresponding period of 1936, an increase of 12.9 million kWh, or 12.8 per cent.

North Wales.—LOWER LIGHTING RATE.—The North Wales Power Co., Ltd., and Electricity Distribution of North Wales and District, Ltd., have reduced their lighting rate to 6d. per kWh in all districts as from July 1st.

Norway.—NEW POWER STATION.—A new steam-operated power station has recently been completed at Oslo to meet peak-load demands and to serve as a stand-by in case of failure of the hydro-electric supply. It contains two "Velox" steam generators, each producing 75 tons of steam per hour, and a 32,000-kW turbine with its condenser and generator. "Velox" steam-raising plant was chosen because of the rapidity with which it can be started up and because it takes up very little space.

Nuneaton.—CHEAPER ELECTRICITY.—For the fourth successive year the Council has authorised reductions in electricity charges, the present concessions amounting to roughly £6,000 in a full year.

Peterborough.—LOAN.—Application is to be made for permission to borrow £11,555 for sub-stations and mains extensions to cover the provision of a duplicate high-voltage cable between Park Road sub-station and Eastfield Road, and additional high-voltage feeders from the Corporation's power station to two sub-stations.

Quorn (Leicestershire).—STREET LIGHTING.—At a recent Council meeting the chairman said that the gas service had been unsatisfactory for some time, and that it was quite a frequent occurrence for a number of the lamps to remain unlighted. It was agreed to call a special meeting to consider the question of providing electric lighting.

Russia.—SHALE AS POWER STATION FUEL.—Plans have been prepared for an increased production of shale and an extension of its utilisation for power-production purposes. There are at present two generating stations using shale for steam-raising, one in Leningrad and one on the Volga. It is stated that by 1942 there will be seven such stations with a total capacity of 530,000 kW.

Scarborough.—SUB-STATION.—The erection of a sub-station on the Spring House Farm Estate, Filey Road, is proposed by the Town Council.

Scotland.—DEVELOPMENT IN THE HIGHLANDS.—The Grampian Electricity Supply Co. is pushing vigorously ahead with schemes for the extension of its area of supply in Ross-shire and Sutherland. Notice has been given of a Special Order to be presented in Parliament providing for an extension of the company's services over a wide area from Thain to Dornoch. Among the places to be served are Edderton, Ardgay, Bonar-bridge, Dornoch, Golspire, Brora, Helmsdale and the intervening districts, including various crofting communities.

Spenborough.—ANNUAL ACCOUNTS.—The 1936-37 accounts of the Electricity Department (engineer and manager, Mr. A. Pickersgill) disclose a net profit of £3,401, against £2,700 in the previous year. Income was £24,230 (£23,617), apart from £1,730 (£1,443) from the showroom, house wiring, &c. Sales of energy totalled 3.7 million kWh, of which 2.5 million kWh was in respect of power supplies.

Sunderland.—LOWER CHARGES.—The Council is recommended to reduce the general lighting tariff to give consumers (chiefly shops and other business premises) a benefit of £4,130 in a full year. Instead of the present 3½d. and 2½d. per kWh during the two winter quarters and 1½d. per kWh during the summer quarters the new rate will be 3d. per kWh for the first 4,800 kWh per quarter and 1½d. per kWh for all units in excess throughout the year.

Thurrock.—OVERHEAD LINES.—Objection is being raised by the Urban District Council to the County of London Electric Supply Co.'s proposal to erect overhead lines in Abbotts Hall Chase, Stanford-le-Hope.

Tonbridge.—TWO-PART TARIFF.—The following two-part tariff has been adopted by the Town Council: Standing charge of £12 10s. per annum per kW of lighting installed, plus ¾d. per kWh. The Council reserves the right to determine if consumers are entitled to the tariff.

Torquay.—ELECTRIC-DISCHARGE LIGHTING.—The Highways Committee recommends the provision of electric-discharge lighting in Newton Road.

West Ham.—BETTER STREET LIGHTING.—Last week the Mayor (Mrs. Parsons) switched on a system of mercury electric-discharge lighting in certain of the main roads. A joint meeting of the Highways and Electricity Committees, together with representatives of the British Thomson-Houston Co., Ltd., was held at the Electricity Offices, and after supper Alderman J. H. Hollins, chairman of the Highways Committee, opened the official portion of the proceedings. The electrical engineer (Mr. J. W. J. Townley) stated that the total length of streets dealt with was about fourteen miles, and the work of changing over had to be carried out in conjunction with the London Passenger Transport Board's contractors as they erected the new poles. The actual cost (£14,503) was £400 less than the estimate. There were still certain gaps left where the old street lighting had been retained, and it might be desirable to complete the job at an early date without waiting for further extension of the trolley-bus routes. The Mayor said she thought the side streets should also be well lighted, and Councillor Wells, chairman of the Electricity Committee, replied that his committee would be pleased to do that.

Distribution Reorganisation

IT is reported that the possibility of forming a joint board comprising the undertakings at Brentford and Chiswick, Ealing, and Heston and Isleworth is being explored. The Brentford and Chiswick Electricity Committee is approaching the Hammersmith Electricity Committee with a view to uniting for the purpose of distribution.

When the Ministry of Transport proposals were discussed at Cheltenham, Alderman J. Moore said that, without committing himself, it was at least feasible that Gloucester and Cheltenham could co-operate on the basis of a joint board, if permitted.

The technical sub-committee of the North Wales and Cheshire local authorities is formulating a scheme for the reorganisation of electricity supplies in North Wales.

At last week's meeting of the Birmingham City Council, Sir Percival Bower said that it would be iniquitous for private companies to be able to acquire small municipal undertakings merely for the amount of their indebtedness, if, on the other hand, municipalities acquiring small private undertakings had to buy out shareholders and meet other charges as well. He estimated that the commercial value of the Birmingham electricity undertaking, for example, was between £30,000,000 and £35,000,000, but it owed only £10,000,000.

Whitby.—REDUCED CHARGES.—The lighting flat rate has been reduced by the Urban District Council from 5d. to 4½d. per kWh and the " unit " charge under the domestic tariff from ½d. to ¼d.

Worcester.—DEPARTMENT'S ACTIVITIES.—In the opinion of Mr. C. M. Shaw, the city electrical engineer, the success achieved by the Electricity Department during the past year provides striking justification of the policy of offering every reasonable inducement to consumers to make a wider and more consistent use of electricity. The revised scale of charges which came into effect in 1935 having been in operation for a full year, it is interesting to notice that the undertaking yielded a net profit of £24,913, against £9,432 in 1935-36, the total income being £148,075 (£131,490) and expenditure £123,162 (£122,058). Energy sold rose by 19 per cent. to 29 million kWh and the number of consumers by 1,017 to 14,317. Consumption per head of the population was 482 kWh. Revenue per kWh (including hire charges, &c.) was 1.22d. and the cost 1.01d. At the end of the year there were 3,780 consumers taking a supply on the rateable value or " all-in " tariffs, the average consumption being 2,119 kWh.

IMPROVED POWER FACTOR.—During the past year an additional 1,832 kW of industrial load has been corrected, the aggregate now operating under improved power-factor conditions being 2,829 kW, with a saving in transformers and e.h.v. cables of 1,502 kVA. Bulk-supply consumers have saved themselves by way of p.f. rebate an average of approximately 8 per cent. on their accounts.

APPARATUS CONNECTED.—With regard to motive power and heating, connections of apparatus notified to the Department by application form during 1936-37 were as follows: Radiators, 1,322; kettles, 1,183; cookers, 1,175; vacuum cleaners, 480; irons, 273; water heaters, 217; wash boilers, 201; motors, 136; tubular heaters, 135; refrigerators, 12; washing machines, 8; hair dryers, 7; fans, 7; clocks, 6; spot welders, 3; percolators, 2; urns, 2; boiling rings, 2; waving machines, 2; toasters, 2; and one steriliser, ironer, battery charger and curling tongs. Actually, the Department itself sold 18 clocks, so it will be realised that the numbers given are not exhaustive.

Worksop.—FURTHER REDUCTION IN CHARGES.—Despite concessions to consumers last year, the Electricity Department (engineer, Mr. M. S. Mason) made a profit during 1936-37 of £5,824, as compared with £4,760 in the previous year. In view of this satisfactory result charges have been further revised in favour of consumers. The new lighting and heating flat rates are 5d. and 1d. per kWh, while under two-part tariffs electricity is obtainable at ½d. per kWh and there is a 1d. per kWh prepayment rate, including hire of apparatus (cooker, &c.). Off-peak supplies for battery charging are at ¼d. per kWh. Concessions in the case of public and town hall lighting represent a saving of £746 to the rates.

Traction

Bournemouth. — ADDITIONAL TROLLEY-BUS ROUTES. — The Minister of Transport has granted the Corporation's application for an Order to operate eight new routes by trolley-buses with the exception of a route at Wallisdown, to which the Poole Corporation and the Hants & Dorset Motor Services, Ltd., entered opposition at the recent public inquiry.

Brazil.—ELECTRIC RAILWAY INAUGURATED.—The Rio de Janeiro suburban electric railway built by the Metropolitan-Vickers Electrical Co., Ltd., has been officially inaugurated by the President, Dr. Getulio Vargas.

Chesterfield.—TRANSPORT DECISION.—Last week the Town Council decided that trolley-buses on the Brampton to New Whittington route should give place to Diesel buses. It was divulged that in ten years the trolley-bus system had cleared off a total debt of £72,343, including £23,415 transport debt, £11,876 for road renewals and £37,052 for the installation of the system. A report of the transport manager and the borough treasurer, however, indicated that in six years trolley-buses would yield a profit of £6,381 and Diesel buses one of £10,536, though it was emphasised that no provision was made for any possible increase in the price of Diesel oil. A miner, who unsuccessfully moved the reference back of the recommendation, said he was not convinced that oil would be cheaper than electricity in the long run. Alderman P. M. Robinson, chairman of the Transport Committee, replied that they could sympathise with the possible loss of livelihood which might accrue to miners, but that was the price they had to pay all along the line for progress.

Glasgow.—£10,000,000 UNDERGROUND EXTENSION.—Experts are to consider a proposed £10,000,000 extension of the municipal underground electric railway. It is recommended that a report shall be prepared on the advisability of extending the subway to provide a service for the new housing suburbs.

Ipswich.—POPULARITY OF TROLLEY-BUSES.—In his report for the past year Mr. H. E. Blackiston, chief engineer and manager of the Electric Supply and Transport Departments, states that the undoubted popularity of the trolley-buses is reflected in an increase of passengers carried of 1.3 millions, bringing the total to 16.5 millions. Income increased by £7,472 to £92,156 and expenditure by £7,494 to £92,051, leaving £105 for transfer to the reserve and renewals account. Expenditure on renewals and alterations amounted to £467, so that the balance was depleted by £362. In this connection Mr. Blackiston says it must be appreciated that the trolley-bus undertaking is still carrying the old tramway debt, which last year added £3,446 to the expenditure.

London.—BLACKFRIARS TRAFFIC SIGNALS.—The complicated system of traffic signals at the junction of Blackfriars Bridge, New Bridge Street, Victoria Embankment and Queen Victoria Street is to be officially inaugurated to-morrow (Saturday). It is estimated that, on an average, 70,000 vehicles pass the junction daily.

Newcastle-on-Tyne.—TROLLEY-BUSES.—The City Council has been recommended by the Northumberland County Council and the Newcastle magistrates to replace the trams on the Gosforth Park route by trolley-buses because of the alleged dangerous condition of the tram track in the area. At a meeting between representatives of the County Council and the City Council it was stated that owing to the large amount of capital involved on this section of the route the City Council was not prepared to change over to trolley-buses at present. Since then the road has been taken over by the Ministry of Transport under the Trunk Roads Act, and the City Council has been asked for details regarding the cost of the change over for submission to the County Council.

South Shields.—TUBE RAILWAY SCHEME OPPOSED.—A meeting of a joint sub-committee of the South Shields and Tynemouth Town Councils has decided to recommend the respective Councils to oppose the scheme of Arthur Whitley, Ltd., contractors, London, for the construction of a Kearney tube railway under the Tyne connecting both towns. The meeting decided that the scheme was inadequate to requirements and any scheme which did not include vehicular and pedestrian traffic, it was stated, would be opposed. A few months ago the Ministry of Transport rejected a scheme for a road tunnel under the river to cost about £1,300,000.

Switzerland.—RACK RAILWAY ELECTRIFIED.—Following the decision to electrify the rack railway up Mount Pilatus (some details of which were given in our issue of June 25th last) the Rigibahn Gesellschaft, of Lucerne, last year resolved to electrify the Rigi line, which begins at Vitznau, 1,443 ft. above sea level, and rises to Rigi Kulm (5,743 ft.). The Rigi is Europe's oldest mountain rack railway, part of it having been opened in May, 1871, and the last section in June, 1873. The total length of the line is just over 4¾ miles and the steepest gradient is 1 in 4. The electrified line will be operated at 1,500 V d.c. Three motor coaches capable of accommodating 80 passengers each and of pushing a 60-passenger non-motor coach have been ordered, the mechanical portion having been allotted to the Swiss Locomotive Works, of Winterthur, and the electrical equipment to the Brown-Boveri Co., of Baden. Each coach will be provided with two motors, each capable of developing 165 kW on a one-hour rating. The maximum running speed on the up-grade will be 11¼ m.p.h. and on the down-hill trip—when the motors will work with lowered pantograph as auto-exciting generators—at 7½ m.p.h. In addition to the motors, the Brown-Boveri Co. is supplying the starting and braking controllers with fifteen starting and braking steps, the starting and braking resistances, the electric signalling devices of six "push " coaches and the electric heating equipment. The existing steam locomotives are being retained, for the time being, for peak-traffic requirements.

West Hartlepool.—TROLLEY-BUSES.—The Town Council is to purchase six double-deck trolley-buses at £1,900 each. It is proposed to promote a Provisional Order to provide for the future development of the trolley-bus service when required.

Communications

Great Britain.—TELEVISION.—According to the *Morning Post*, new television cameras several times more sensitive than any hitherto used will shortly be delivered to the B.B.C. They should be easily capable of televising scenes inside theatres under normal production conditions. Another new development is the adjustment of television cameras for " colour response," according to the subject to be transmitted. It is estimated that more than 3,000 television receivers are now in use, the number of " viewers " having trebled since Easter.

Irish Free State.—SHORT-WAVE STATION.—For some time the erection of a short-wave radio station has been under consideration by the Department of Posts and Telegraphs, the principal difficulty being the heavy cost of upkeep. The Department, it is stated, now considers that the stage has been reached when the revenue derived from the broadcasting service is sufficient to warrant the erection of a short-wave transmitter. The station will be of an experimental character and operation will not be continuous for a time.

Italy.—NEW SUBMARINE CABLE.—The Government has recently voted the necessary funds for the laying of a new submarine telephone and telegraph cable between Sicily and Tripoli.

Japan.—TELEVISION.—According to *Telegraphen und Fernsprech Technik*, the Japanese Broadcasting Co. is already arranging for the installation of television transmitting equipment for use in connection with the Olympic Games to be held in Tokio in 1940.

Liberia.—RADIO-TELEGRAPHY.—A direct radio-telegraph service has been inaugurated by the Radio Corporation of America between New York and Monrovia, the capital of Liberia.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Australia.—MELBOURNE.—August 10th. State Electricity Commission of Victoria. One experimental high-capacity self-cleaning disc screen, in accordance with Spec. No. 37/55. Agent-General for Victoria, Melbourne Place, London, W.C.2.
August 23rd. Harbour Trust Commissioners. Two 3-ton semi-portal electric cranes. (T.Y. 24974/37.)*

Birmingham.—July 19th. Watch Committee. Electric lighting and power supply and one electric passenger bed lift at the new Pathological Block, Mortuary, Newton Street; and electric lighting and power supply at the new Digbeth Police Station. H. J. Manzoni, city engineer, Council House (deposit £2 in each case).

Blackpool.—July 27th. Borough Council. Stores, &c., for one year. (July 9th.)

Bristol.—July 30th. Corporation. Reactors, transformers, switchgear, &c. (July 9th.)

Bury.—July 19th. Electricity Committee. Twelve months' supply of p.i. l.c. cables. (July 2nd.)

Cardiff.—July 26th. King Edward VII Welsh National Memorial Association. Cables and joints, lighting and power and machinery and apparatus, including rectifiers, motors, &c., at the Glan Ely Hospital. (See this issue.)

Congleton.—July 30th. Borough Council. One 2,000-kVA outdoor type transformer, complete with on-load tap-changing equipment, at the Bromley Road sub-station. (See this issue.)

Dartford.—July 24th. Borough Council. Cable. (July 9th.)

Edinburgh.—September 13th. Borough Council. Two feed pumps, de-aerator, evaporator, pipework, &c., at the Portobello generating station. (See this issue.)

Egypt.—CAIRO.—August 24th. Ministry of Public Works. Electric pumping station and its transmission line connection, complete with building work, machinery and accessories, at Bosat. Chief inspecting engineer, Egyptian Government, 41, Tothill Street, London, S.W.1 (deposit £3 1s. 6d. not returnable).

Finchley.—July 26th. Borough Council. Electrical supplies for eighteen months. (July 9th.)

Halifax.—July 15th. Health Committee. Two electric passenger and bed lifts at the General Hospital. D. T. Lloyd Jones, borough engineer, Crossley Street (deposit £1 1s.).

Heston and Isleworth.—July 26th. Electricity Department. Sheet steel kiosk, complete with switchgear and one 300-kVA transformer; and 11-kV and 400-V switchgear. (See this issue.)

Huddersfield.—July 23rd. Corporation. Electrical work in connection with the Technical College extensions. Offices of the Borough Engineer and Surveyor, High Street Buildings.

Hull.—Telephone Committee. Bronze wire. (July 9th.)

India.—SIMLA.—August 14th. Stores Department. Electric lamps. (T. 25004/37.)*

Inverness.—July 19th. Town Council. Electric lighting at the South Kessock housing estate (6th. development). W. Smith, architect, 52, High Street.

Irish Free State.—DUBLIN.—August 7th. Electricity Supply Board. One 3,000-kVA transformer, with on-load tap-changing equipment, at the generating station, Ardnacrusha, Limerick. (July 9th.)

Kingston-upon-Thames.—July 31st. Corporation. E.h.v. indoor type, remote controlled switchgear. (July 9th.)

London.—FULHAM.—July 21st. Borough Council. House telephone, fire alarm and call sign systems at the power station, Townmead Road. (July 2nd.)
COMMISSIONERS OF WORKS.—July 28th. Steel conduits and fittings for electric wiring. (See this issue.)

Manchester.—July 19th. Electricity Committee. 6,600-V and 400-V overhead lines, with switchgear and one 25-kVA transformer. (July 9th.)
July 20th. Transport Committee. Cadmium copper trolley wire, grooved and circular sections. General manager, Corporation Transport Department, 55, Piccadilly.

New Zealand.—WELLINGTON.—October 5th. Public Works Department. 20,000-kVA transformer bank. (T.Y. 24415/37.)*
August 10th. Engine-driven generating sets and switchgear. (T.Y. 24741/37.)*
October 26th. Four 2,500-kVA transformers and accessories. (T.Y. 24834/37.)*
November 2nd. Testing transformer, induction regulator, control bench, switchgear, &c. (T. 24835/37.)*
October 12th. 110-kV outdoor switchgear and steelwork. (T.Y. 24915/37.)*

Prestatyn. — July 19th. U.D.C. Electricity Department. Cable. (July 9th.)

Prestwich.—July 28th. U.D.C. Twenty lanterns, complete with 150-W sodium lamps and all necessary electrical apparatus, and twenty steel tube pole extensions and bracket arms, to give a projection of 6ft. to centre of lantern. Engineer and surveyor, Town Hall.

Seaton Valley.—U.D.C. Electrical installations at fifty-eight houses on the Station Road estate, Cramlington. Surveyor, Council Offices, Shiremoor.

South Africa.—JOHANNESBURG.—July 24th. City Council. House service type electricity meters. (T.Y. 24641/37.)*
August 14th. Three 6,000-kVA transformers, with associated equipment, for the Forest Town sub-station. (T. 2464/37.)*
August 14th. Rotary convertors, machine and starting panels, with instruments and necessary cables, &c. (T. 25180/37.)*
August 9th. Railways and Harbours Administration. Electric lamps. (T. 25102/37.)*
PORT ELIZABETH.—July 22nd. City Electrical Engineer's Department. Transformers, cables, switchgear, meters, &c. (T. 24623/37.)*
PRETORIA.—August 6th. Union Tender and Supplies Board. H.v. and l.v. switchgear and one 25-kVA transformer. (T.Y. 24649/37.)*
August 20th. Public Works Department. Switchgear. (T. 25111/37.)*
UNIONDALE.—July 26th. Municipality. Plant for power station and distribution network. (T.Y. 24794/37.)*
CAPE TOWN.—August 4th. Electricity Supply Undertaking. Transformers, copper wire, steel lighting poles and fittings, insulators and two switchboards. (T. 25187/37.)*

South Cambridgeshire.—July 27th. R.D.C. Duplicate vertical spindle centrifugal borehole pumps (8,000 gal. per hr. each), driven by electric motors, with automatic operation, and accessories. Sands & Walker, consulting engineers, Milton Chambers, Nottingham (deposit £2 2s.).

Torquay.—August 18th. Electricity Undertaking. 33/11-kV transformers and switchgear, 33-kV, 11-kV and auxiliary cables and 33-kV overhead lines. (See this issue.)

Walton and Weybridge.—July 26th. U.D.C. Electricity Department. Twelve months' supply of domestic wash boilers. (See this issue.)

Warrington.—July 20th. Health Committee. Electric lighting, heating, power, clocks, signalling, fire alarms, radio and telephones at the Borough General Hospital. (July 9th.)

Warwickshire.—County Council. Heating and electrical work. (See this issue.)

York.—August 5th. County Council. Electric lighting and heating apparatus at a new elementary school at Bilton, Hull. Particulars from the County architect, County Hall, Beverley (deposit £3 3s. in each case), by July 23rd.

---

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Birkenhead.—Electricity Committee. Accepted. Wiring twenty-nine houses (£130).—Park Electric Co. Cooker control units.—Revo Electric Co.

Birmingham.—Education Committee. Accepted. Electrical work in connection with the erection of a school at Sheldon (£781).—H. Pratt.

Dewsbury.—Town Council. Accepted. Switchgear for the Vulcan Road sub-station (£555).—Switchgear & Cowans.

Dunfermline.—Town Council. Accepted. Electric lighting work in connection with the erection of seventy-two houses at Kingseathill (£796).—T. S. Miller.

Eyemouth (BERWICKSHIRE).—Town Council. Accepted. Electrical work at twenty-eight houses at Blebe (£191).—A. Addison.

Fareham.—U.D.C. Accepted. Switchgear (£601).—Johnson & Phillips.

Johnstone (RENFREWSHIRE).—Town Council. Accepted. Electric lighting at 284 houses on the Howwood Road site (first development).—J. Sweeney.

Leeds.—Electricity Committee. Accepted. Cables.—B.I. Cables (£1,502); Henley's (£2,367); Hackbridge Cable Co. (£1,832).
Transport Committee. Accepted. Electrically operated roller shutters at Kirkstall Road depôt (£185).—Mather & Platt.

Lichfield.—Electricity Committee. Accepted. E.h.v. and l.v. switchgear, copper interconnections, racks and screens (£463).—Ferguson, Pailin. 600-kVA transformer (£354).—Hackbridge Electric Construction Co.

Liverpool.—Power and Lighting Committee. Accepted. Twelve 1,000-kVA transformers (£442 each).—Met.-Vick. Elecl. Co.

London.—METROPOLITAN WATER BOARD.—Boiler control instruments at the waterworks, Hampton:

	£		£
Electrofio Meters Co. Accepted ...	**5,238**	George Kent, Ltd.	6,502
James Gordon & Co.	6,267	Elliott Bros. (London)	7,350
Allen West & Co....	6,450		

L.C.C.—Education Committee. Accepted. Reconditioning electrical installations at schools: Waldron Road, Wandsworth (£994).—Carr Bros.; Maidstone Street, Shoreditch (£995).—Bective Electrical Co.; Knapp Road, Bow (£842).—Burdette & Co.
L.C.C.—Electric wiring at Battersea Fire Station:

	£		£
W. H. Gaze and Sons. Accepted...	**700**	Read and Partners	738
Bower Engineering Works (Electrical and General)	720	Electrical Installations, Ltd. ...	767
W. J. Furse and Co. (London) ...	735	Jacob White and Co.	818

Wiring and fittings for electric lighting in two blocks of dwellings on the Lilford Road site, Lambeth:

	£		£
Holliday and Son (Electrical). Accepted	**2,055**	F. G. Edey and Co.	2,318
Archibald Meckhonik	2,093	Pinching and Walton	2,371
Jacob White and Co.	2,140	Electrical Installations, Ltd. ...	2,399
J. L. Shadwell	2,198	Springvale Electrical Co. ...	2,770
Samuel Reed and Sons	2,252	Caine Pernot, Ltd.	3,292

Wiring and fittings for electric lighting, etc., in six blocks of dwellings (Dorset Road, Newburn Street, Tinworth Street and Pearson's Place areas, Lambeth):

	£		£
Holliday and Son (Electrical). Accepted	**3,873**	City Electrical Co.	4,438
Jacob, White and Co.	3,892	G. E. Taylor and Co.	4,457
Archibald Meckhonik	4,032	Pinching and Walton	4,487
Samuel Reed and Sons	4,225	Francis Polden and Co.	4,683
Coleby and Co.	4,284	Electrical Installations, Ltd. ...	4,716
Read and Partners	4,384	Alexander Hawkins and Sons ...	4,941
		F. H. Wheeler and Co.	4,959

Norfolk.—County Council Assistance Committee. Accepted. Electrical installation at East Dereham Hospital (£2,080).—Christy Bros. & Co.

Northampton.—Housing Committee. Accepted. Electric lighting at twenty houses on the Heathville estate (£136).—Electrical Installation Co.

Northern Ireland.—BELFAST.—Education Committee. Accepted. Electric lighting installation at Model schools (£406).—Lewers Carroll & Co.

Oldbury.—Education Committee. Accepted. Electrical installation at Moar Farm school (£979).—Etna Lighting & Heating Co.

Rugby.—Town Council. Accepted. Closed circuit fire alarm system (£2,081).—Standard Telephones. Cable, &c. (£783).—Henley's.

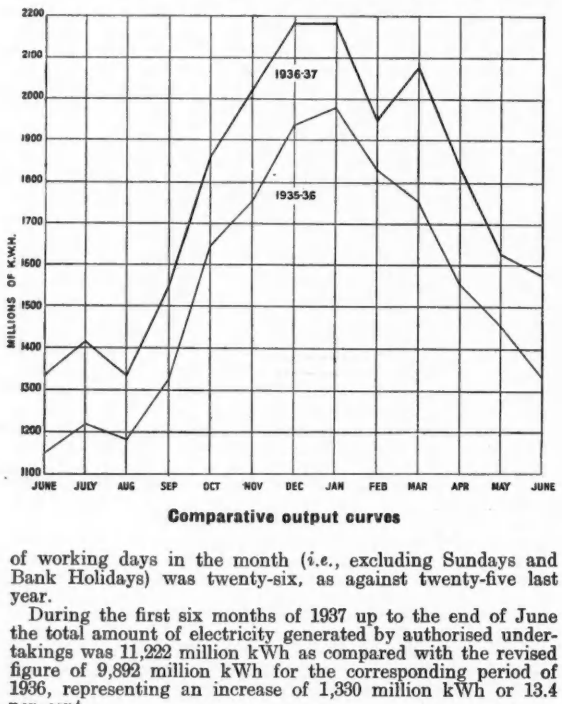
Salop.—Education Committee. Recommended. Electric lighting and power at the Technical College, Shrewsbury (£4,602).—Rashleigh Phipps & Co.

Sunderland.—Public Assistance Committee. Accepted. Single-deck electric oven, complete with wiring, at the Highfield Institution (£726).—Baker, Perkins, Ltd.
Town Council. Accepted. Two electric cranes (£13,305).—Stothert & Pitt.

Surrey.—County Council. Accepted. Electrical work at new hospital on the St. Helier estate (£62,661).—T. Clarke & Co.

Generation of Electricity in June

THE official returns rendered to the Electricity Commissioners show that 1,575 million kWh of electricity was generated by authorised undertakings in Great Britain during June, 1937, as compared with the revised figure of 1,334 million kWh in the corresponding month of 1936, representing an increase of 241 million kWh, or 18.1 per cent. The number



Comparative output curves

of working days in the month (*i.e.*, excluding Sundays and Bank Holidays) was twenty-six, as against twenty-five last year.

During the first six months of 1937 up to the end of June the total amount of electricity generated by authorised undertakings was 11,222 million kWh as compared with the revised figure of 9,892 million kWh for the corresponding period of 1936, representing an increase of 1,330 million kWh or 13.4 per cent.

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

ELKALOY and DURANA ELEKTRA copper rod for spot welding.

Readers should enclose stamped addressed envelopes when making their inquiries.

Notes

A Useful Heating Manual

We have received from the engineer and manager to the State Electricity Commission of Victoria (Mr. G. G. Jobbins) a noteworthy piece of consumer-educating literature. It is a "Manual of Electric Heating Devices and Applications" and covers the construction and operation of standard equipment for all heating applications requiring temperatures up to about 1,000 deg. F. The first part is devoted to general aspects of heating—the advantages of electricity for the purpose, fundamentals of heat, conversion of electricity into heat and thermal insulation. Next follow a section covering eight forms of heating elements and one on applications for air and water heating, cooking and baking, heat treatment of metals and various other commercial uses. The volume is completed with a chapter on thermostats and some useful tables (specific heats, melting points and latent heats of fusions of a number of materials). In its 105 pages, including 50 illustrations, it embodies more information on the subject than we have come across in any publication of the kind. Mr. Jobbins says that copies are available from the Electricity Supply Department, State Electricity Commission of Victoria, 238, Flinders Street, Melbourne.

Aluminium Overhead Lines

A new edition of the publication entitled "Overhead Transmission Lines" has been issued by the British Aluminium Co., Ltd. This differs from the edition of 1934 mainly by the substitution of particulars of more recent practice for those previously given. Thus a different typical form of P.G. clamp is illustrated, the "N.T." cone connector takes the place of the "S.T." type for straight-through joints, and a reinforced tie supersedes the armour-top tie. Apart from details of accessories which are given in a convenient and well-arranged form, the case for the use of aluminium in transmission and distribution is logically discussed.

An Electrical Heat Treatment Furnace

A heat-treatment furnace, claimed to be the only one of its kind in England and one of three in the world, has recently been installed at the Ford motor car works, Dagenham. The furnace is used for heat-treating copper-silicon alloy brake drum castings. Two more plants of about the same size will be installed shortly; they will work as a unit and be used for special alloy castings, which replace forged parts. The new furnace is 68 ft. in length and 5 ft. 3 in. wide; it is heated by means of cast grid elements and operates at up to 1,750 deg. F. Approximately half-way through there is a water-cooled section which enables the quick and slow cooling sections of the heat cycle to be maintained. The furnace has a capacity of 3,000 lb. per hr. The castings are placed on high nickel-chromium alloy trays, each holding 250 lb. of castings. The trays pass through the furnace on a roller hearth consisting of 3 in. diameter rollers of the same alloy as the trays. The temperature of the furnace is automatically controlled by twelve Leeds and Northrup temperature recorders and controllers which maintain the heat to within ±5 deg. and give a complete daily record of what has happened in the furnace.

I.E.E. South Midland Centre

The summer meeting of the South Midland (Birmingham) Centre of the Institution of Electrical Engineers took the form of a visit last week to the Eastleigh works of the Pirelli-General Cable Works, Ltd. The party of about 130 included Sir A. G. Lee (president-elect of the Institution), Messrs. E. A. Reynolds (chairman) and H. Hooper and H. Faulkner (vice-chairmen of the South Midland Centre), Mr. S. T. Allen (C.E.B.), Mr. G. Martinez (general manager), Mr. R. E. Horley (works manager and chairman of the Hampshire Sub-Centre), Mr. T. Warren and other members of the Pirelli Co.'s staff, who welcomed the visitors for luncheon at Lyndhurst. During the afternoon the ladies of the party drove through the New Forest to Beaulieu Abbey, later rejoining the gentlemen for tea at the works, a feature of which is the new rolling mill for producing electrolytic wire bars and strips from copper ingots. This mill supplies all the copper wire required for cable making at the Eastleigh and Southampton works and has been in full operation for just over a year.

Appointments Vacant

Area Officer for the British Electrical Development Association for Central England (Birmingham).

Demonstrator in the electrical engineering branch of the Military College of Science, Woolwich.

Lady demonstrator for Worcester Electricity Department.

Junior assistant engineer for Basingstoke Electricity Department.

Male showroom assistant and lady demonstrator for Middleton Electricity Department.

Chief costs clerk for Watford Electricity Department.

Electrician at the County Sanatorium, Harefield, for Middlesex County Council.

Mechanical and electrical engineers in the drawing office of the Air Ministry.

Two senior male showroom sales assistants for the Stretford and District Electricity Board.

Lady demonstrator for Bethnal Green Electricity Department.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

The I.E.E. Council.—The scrutineers appointed by the Institution of Electrical Engineers have reported to the president that the result of the ballot to fill the Council vacancies which will occur on September 30th next is as follows:—President: Sir George Lee, O.B.E., M.C. Vice-presidents: Sir Noel Ashbridge, B.Sc. (Eng.), and Mr. J. R. Beard, M.Sc. Hon. Treasurer: Mr. W. McClelland, C.B., O.B.E. Ordinary Members of Council:—Members: Col. A. S. Angwin, D.S.O., M.C., and Messrs. P. L. Riviere, C. Rodgers, O.B.E., and C. D. Taite. Associate Members: Dr. T. E. Allibone and Mr. G. A. Whipple. Companion: Mr. E. Leete.

Miss K. M. Shaw has been appointed showroom manager in the Worcester Corporation Electricity Department.

Mr. H. Dinsmore, A.M.I.E.E., meter superintendent with the Peterborough Electricity Department, has been appointed meter superintendent to the City of Carlisle electricity undertaking.

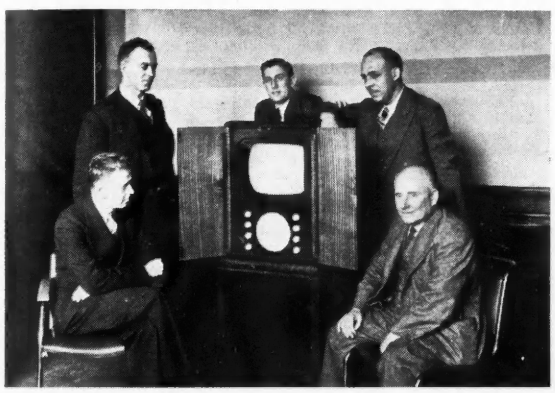
Major L. J. Westbury, formerly of the General Electric Co., Ltd., has joined Tricity Cookers, Ltd., as sales engineer for the Southern Counties.

Mr. G. W. S. Hawes has been elected a director of the North Metropolitan Electric Power Supply Co. in succession to the late Sir Austen Chamberlain.

Mr. H. R. Burnett, electrical engineer to the Barrow-in-Furness Corporation, is to retire in February of next year.

Mr. J. E. Orringe, son of Mr. Joseph Orringe, a past-president of the Electrical Contractors' Association, was married on July 8th at Leicester to Miss Daisy Brewin.

Following a recent visit of Mr. M. R. Taylor and Dr. Searby, chief television engineers of Ferranti, Ltd., to the United States for an exchange of views on radio matters, Mr. Lewis and Mr. Loughran, of the Hazeltine Corporation, are paying



American engineers at the Moston works of Ferranti, Ltd. Left to right: Mr. Loughran, Mr. M. K. Taylor, Dr. Searby, Mr. Lewis, and Mr. A. Hall

a visit to the Ferranti organisation in this country. The accompanying illustration shows a group at the Moston Works inspecting one of the latest Ferranti television receivers.

Mr. F. Sampson, of the head office Sales Department of the General Electric Co., Ltd., has been appointed assistant manager of the company's Glasgow Branch in succession to **Mr. A. S. Black,** who was recently promoted manager.

The wedding took place at St. Mary's Church, Knighton, Leicester, of **Miss Elsie May Whittle,** a former local secretary of the E.A.W., and **Mr. William H. Hallam.** Both bride and bridegroom were employés of the Midland Dynamo, Co., Ltd.

Mr. F. A. N. Hitch has been awarded the Archibald P. Head Memorial Medal and Prize (Electrical Engineering) at University College, London, in the Faculty of Engineering.

Mr. J. G. Fleming, an assistant lecturer at Battersea Polytechnic, has been appointed head of the electrical engineering and physics department of Coventry Technical College.

Mr. E. W. L. Morley, A.M.I.E.E., has resigned from the staff of the London County Council, Chief Engineer's Department, and is sailing for Singapore to-day (Friday) to take up an appointment with United Engineers, Ltd. Mr. Morley received his technical education at University College, Nottingham, and his early training with Siemens Bros. & Co., Woolwich. After four years in India with the Bombay Telephone Co. he returned to England in 1931 and rejoined Siemens Bros., leaving in 1934 to take up a position on the Chief Engineer's staff of the L.C.C.

Mr. D. A. Picken, of Bloxwich, Staffs, has been appointed consumers' engineer with the Workington Corporation Electricity Department in succession to **Mr. G. F. Lyons,** who has secured a similar appointment with the Middleton Corporation.

Mr. G. H. Bayliss and **Mr. R. Nicholls** have been elected to the board of directors of Wm. Sanders & Co. (Wednesbury), Ltd. Mr. Bayliss, who served his apprenticeship with the British Thomson-Houston Co., Ltd., Rugby, has been chief

[*Whitlock & Sons, Ltd.*

Mr. G. H. Bayliss **Mr. R. Nicholls**

engineer of Wm. Sanders & Co. for the past ten years, while the election of Mr. Nicholls marks the completion of nineteen years' service with Mr. William Preston and the company, of which Mr. Preston is managing director.

Mr. E. H. J. Barnes, of Horsham, has been appointed shift engineer at the Crewe electricity works.

Mr. J. Anderson, a director of Anderson, Boyes & Co., Ltd., electrical engineers, of Flemington Electrical Works, Motherwell, has been presented with a silver salver from the staff and with a dining-room clock and antique ornaments to match by the employés on the occasion of his marriage. The former gift was presented by Mr. R. Russell, and the latter by Mr. J. Buchanan, one of the oldest employés of the company.

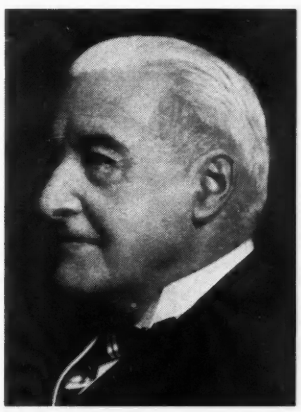
Mr. E. F. J. Holcombe Hewlett, who has retired from the position of electrical engineer and manager at Mansfield, has been presented by Corporation officials with a silver salver. The presentation was made by the town clerk.

Mrs. W. H. Palmer (*née* Norah Miller), manager of the Publicity Department of the Edison Swan Electric Co., Ltd., who was married at Bush Hill Park on July 3rd, is spending her honeymoon at Le Touquet, and is expected back next week.

Mr. E. B. Percival, A.M.I.E.E., who has retired from the position of resident engineer to the Wellingborough Electric Supply Co., Ltd., has been presented with a cheque from the staff. Mr. C. A. C. Cullimore made the presentation to Mr. Percival, who has also received a radio set from the administrative staff of the Northampton Electric Light and Power Co., Ltd., of which the Wellingborough concern is a subsidiary.

Obituary

Sir Francis Fladgate.—The death of Sir William Francis Fladgate, M.V.O., removes from our midst one who had been continuously and prominently connected with private enterprise in electricity supply in London for forty-seven years. There are few still actively engaged amongst us who were on the scene when he joined the board of a company, known as the **Electricity Supply** Corporation, Ltd., in the year 1890. That company was formed to acquire the small generating station which had been established by Messrs. A. & S. Gatti; in 1890 he also became chairman of what is now the Charing Cross Electricity Supply Co., Ltd. Sir Francis, who died on July 12th, in his 85th year—a memorial service is being held at noon to-day at St. Martin-in-the-Fields — led the movement, with others, in the direction of joint action between the London electricity supply companies, a policy which has been responsible for grouped activity between various interests for many years, as related in the ELECTRICAL REVIEW for



[*Elliott & Fry.*

The late Sir Francis Fladgate

February 3rd, 1928 (page 202). In 1921, when many of the London companies were submitting their ideas for a general scheme for London to the Electricity Commissioners, Sir Francis Fladgate took the leading part on the administrative side in propounding the scheme of ten companies acting together under the title of the London Electricity Joint Committee (1920), Ltd: This committee later became the London Power Co., Ltd. Sir Francis, who was an eminent solicitor and had been a vice-president of the Incorporated Law Society, took a leading part in all the discussions of the London companies' controversy that extended over many years. He was chairman of the London Power Co. to the last; in referring to the work of that company in 1928, we remarked: "It has been largely owing to his personal tact in dealing with the companies concerned that the close and friendly union among them has been brought about." Sir Francis was made M.V.O. in 1911, and in 1932 received the honour of knighthood.

Mr. W. T. Hawken.—The death has occurred from pneumonia, at the age of fifty-two, of Mr. William T. Hawken, A.M.I.E.E., AM.I.M.E., who was living in retirement at King's House, Ford End, Essex. Mr. Hawken went to India and Singapore, where he was responsible for important electrical installations. After the war he went to North Chile as an engineer in the nitrate mines. He returned to England when the mines closed down.

Mr. W. J. Birnie.—The death is announced of Mr. William James Birnie, M.I.E.E., of the P. & O. Steam Navigation Company, Bombay, which occurred on July 10th, at Bedford.

Wills.—Mr. A. G. Giton, of the Giffre Electro Chemical Co., left £26,650, with net personalty £24,428.

Mr. W. H. Mungall, a director of Crieff Electric Supply Co., and of other companies, left £158,987.

Mr. G. Newby, electrical engineer, of Harrogate, left £37,672, with net personalty £37,018.

Mr. S. C. Hobson, chairman of the Melton Mowbray Electric Light Co., left £63,554, with net personalty £62,232.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

British Air King Radio, Ltd.—Private company. Registered July 5th. Capital, £2,000. Objects: To acquire the business of a dealer in radio and electrical equipment and apparatus now carried on by H. Greenland, and to carry on the business of manufacturers, importers and exporters of and dealers in gramophones and sound reproducing machines, automatic machines, electric accumulators and batteries, wireless aerials, cabinets, dials, knobs, condensers, valves, &c. The directors are: W. B. Dick (chairman), 27, Radnor Place, W.2, O. R. B. Dick, 32, Sheffield Terrace, W.8, and H. Greenland, address not stated. Secretary (pro tem), F. H. Pratt. Registered office: 76, New Oxford Street, W.1.

Sutherland Electrical, Ltd.—Private company. Registered July 9th. Capital, £1,000. Objects: To carry on business as electrical, mechanical and general engineers and contractors, to carry out electrical installations, &c. The subscribers are: A. Spencer, 47, Beverley Gardens, Stanmore, Mddx.; and D. B. Hicks, 21, Launceston Road, Greenford. Secretary: A. Spencer. Registered office: 312, Kilburn High Road, N.W.6.

P. & R. Products, Ltd.—Private company. Registered in Edinburgh July 8th. Capital, £1,000. Objects: To carry on the business of electrical and mechanical engineers, suppliers of electricity for light, heat, motive power, &c. The directors are: H. M. Robb, 595, Paisley Road West, Glasgow, S.W.1; and H. S. Porter, 2, Keith Terrace, Blackhall, Edinburgh. Registered office: 595, Paisley Road West, Glasgow, S.W.1.

Glynne Williams & Co., Ltd.—Private company. Registered July 7th. Capital, £2,000. Objects: To carry on the business of manufacturers of and dealers in wireless sets, gramophones, radiograms, electrical goods, &c. The directors are: H. Davenport, 17, Strathmore Court, St. John"s Wood, N.W., H. J. Rich, 54, Hillside Crescent, Leigh-on-Sea, and W. F. W. Senff, 50, Carlton Road, Erith, Kent. Secretary: H. J. Rich. Registered office: 36, Soho Square, Oxford Street, W.1.

Atlas Radio, Ltd.—Private company. Registered July 7th. Capital, £100. Objects: To acquire the benefit of the registered trade marks "Atlas" Nos. 452,198, 525,523, 525,524 and 529,914, together with the goodwill of the business concerned in the goods for which these trade marks have been registered, and to carry on the business of manufacturers of and dealers in radio and electrical apparatus, &c. The subscribers are: P. T. Kendrick, 27, Cleveland Road, Ilford, and E. J. Jones, 132, Alverstone Road, E.12. Secretary: P. T. Kendrick.

A. T. Dunderdale, Ltd.—Private company. Registered July 8th. Capital, £1,500. Objects: To acquire the business of a radio dealer and engineer carried on by A. T. Dunderdale at 159, Water Street, Leyland. The directors are: A. T. Dunderdale, and L. Dunderdale, both of 159, Water Street, Leyland, Lancs; and J. Dellow, "Holyrood," Clitheroe Road, Whalley, Lancs.

Brownlee Bros., Ltd.—Private company. Registered in Dublin July 6th. Capital, £5,000. Objects: To carry on the business of distributors and manufacturers of and dealers in wireless sets and parts, electrical and mechanical goods or parts, &c. The directors are: F. W. Brownlee, 5, Maretimo Gardens, Blackrock, Co. Dublin; and W. Brownlee, Tymon, Greenfield Road, Mount Merrion, Blackrock, Co. Dublin. Secretary: W. Brownlee.

Miller Sign Co., Ltd.—Private company. Registered July 10th. Capital, £2,000. Objects: To acquire the business of an electrical engineer and manufacturer of Neon Signs carried on by H. Miller at 65-7, Paradise Street, Liverpool, and to carry on the business of manufacturers of and dealers in neon and other signs, &c. The directors are: H. Miller, 3, Bromley Avenue, Liverpool, 15, and H. A. Miller, 11a, Hillcrest Drive, Greasby, Wirral. Registered office: 65-7, Paradise Street, Liverpool.

Richard Clarke (Equipments), Ltd.—Private company. Registered June 30th. Capital £100. Objects: To carry on the business of manufacturers of and dealers in electrical goods of all kinds, including lamps, bells, fires, stoves, cookers, switchboards, &c. The subscribers are: J. Shein, 37, Trinity Close, Clapham Common, S.W.4; and S. R. Bright, 28, Rowhill Mansions, Clapton, E.5. S. R. Bright is the first director. Registered office: 28, Fenchurch Street, E.C.3.

Returns of Electrical Companies

Electrical Distribution of Yorkshire, Ltd.—Capital £3,200,000 in £700,000 6 per cent. cumulative preference stock, £1,500,000 ordinary stock, 500,000 6 per cent. cumulative preference shares of £1 each, and £500,000 unissued. Return dated March 22nd, 1937. £700,000 6 per cent. cumulative preference stock. £1,500,000 ordinary stock and 500,000 6 per cent. cumulative preference shares of £1 each issued. £2,446,222 paid on all preference and ordinary stock and 7s. per share on preference shares (leaving £253,778 still to be called). Mortgages and charges, nil.

Smith & Ansell, Ltd.—The nominal capital has been increased by the addition of £6,000 in £1 ordinary shares beyond the registered capital of £12,000. The additional capital is divided into 6,000 ordinary shares of £1 each. Falk, Stadelmann & Co., Ltd., of 91/93, Farringdon Road, E.C., were allotted 5,000 shares for cash in October, 1936.

Safeguard Electrical Appliances (Dewsbury), Ltd.—Mortgage for £1,196 10s., dated September 13th, 1920, charged on property in Dewsbury (being property acquired by the company on March 23rd, 1937). Registered June 14th, 1937, pursuant to Sections 81 and 85 of the Companies Act, 1929. Mortgagees: Dewsbury and West Riding Building Society.

Radio Vacuum Cleaners, Ltd., in voluntary liquidation.—R. H. Stevens, of 37, Walbrook, E.C.4, ceased to act as receiver and manager on July 5th, 1937.

Electrical Manufacturers Finance Co., Ltd.—Capital, £10,000 in £1 shares. Return dated March 19th, 1937. All shares taken up. £2,502 paid. Mortgages and charges, nil.

Electrical Trading Association, Ltd.—Capital, £10,000 in £1 shares. Return dated January 14th, 1937. 2,502 shares taken up. £2,502 paid. Mortgages and charges, nil.

United Telephone Cables, Ltd.—Capital, £1,000 in £1 shares. Return dated April 22nd, 1937. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Western Electric Co., Ltd.—Capital, £20,000 in £1 shares. Return dated May 4th, 1937. All shares taken up. £20,000 paid. Mortgages and charges, nil.

Universal Electric Time & Telephone Systems, Ltd.—Memorandum of deposit dated June 24th, 1937, to secure £1,500, charged on 48 rental agreements between the company and subscribers, the total annual rental value being £756 16s. Holders: F. D. Sharples, 20, Chapel Street, Liverpool, and others.

Bowyer-Lowe & A.E.D., Ltd.—Cyril Hastings, of 10, Prince Albert Street, Brighton, was appointed receiver on July 1st, 1937, under powers contained in two instruments dated August 14th, 1934, and May 29th, 1935.

Wholesale Lamp Co., Ltd.—H. E. Wall, of 47, Milsom Street, Bath, ceased to act as receiver on June 19th, 1937.

A. L. Turner, Ltd.—G. T. West, of 26, Brent Bridge Road, Fallowfield, Manchester, was appointed receiver on June 26th, 1937, under powers contained in instrument dated January 8th, 1933.

Alton District Electricity Co., Ltd.—Capital, £35,000 in £1 shares. Return dated March 25th, 1937. All shares taken up. £35,000 paid. Mortgages and charges nil.

J. H. Holmes & Co., Ltd.—Capital, £100,000 in £1 shares. Return dated April 22nd, 1937. 50,000 shares taken up. £50,000 paid. Mortgages and charges nil.

Radio & Allied Sales, Ltd.—Capital, £5,000 in £1 shares. Return dated January 14th (filed April 23rd), 1937. All shares taken up. £2,000 paid (£1 per share on 2 and 8s. on 4,998 shares). Mortgages and charges nil.

F. B. Hellon & Co., Ltd.—Capital, £4,000 in £1 shares. Return dated June 18th, 1936 (filed April 23rd, 1937). 3,000 shares taken up. £3,000 paid. Mortgages and charges nil.

Electrical Components, Ltd.—The nominal capital has been increased by the addition of £40,000 in £1 ordinary shares, beyond the registered capital of £60,000.

Boynton & Co., Ltd.—W. F. Wyatt, Sun Building, Bennetts Hill, Birmingham, ceased to act as receiver and/or manager on July 5th, 1937.

James Keith and Blackman Co., Ltd.—The nominal capital has been increased by the addition of £250,000 beyond the registered capital of £250,000. The additional capital has been divided into 150,000 5½ per cent. cumulative preference shares of £1 and 200,000 ordinary shares of 10s. The 200,000 ordinary shares of £1 in the original capital have been subdivided into 400,000 ordinary shares of 10s. It is also proposed to change the name of the company to Keith Blackman, Ltd.

Sunbeam Vacuum Cleaner Co., Ltd.—D. C. Thomson, 150, Southampton Row, W.C.1, was appointed receiver and manager on June 23rd, under powers contained in debentures dated December 10th, 1934.

Mersey Cable Works, Ltd.—The nominal capital has been increased by the addition of £30,000 in £1 ordinary shares, beyond the registered capital of £40,000. Tube Investments, Ltd., of Paddock Works, Oldbury, own practically the whole of the issued shares.

City Notes

The Atlas Electric & General Trust, Ltd., held its annual meeting on July 9th when Mr. W. S. Poole (chairman), who presided, said that as regards the subsidiary company the year under review had been one of extreme difficulty. Although the economic position of the Republic of Uruguay continued to improve, there was considerable labour unrest. There was a strike of the tramway traffic personnel from April 26th to May 2nd, 1936, which was settled by the Government authorising the tramway company to increase its fares subject to its increasing the wages of the men. This arrangement had not solved the problems, but intensified the difficulties of the tramway company. The final result of the year's operations, before making provision for depreciation, was a loss of 173,073 pesos, against a profit of 182,417 pesos in the previous year. Another strike of the tramway traffic employés started on April 27th this year, and lasted until May 11th. This entailed serious loss to their subsidiary, which would be reflected in the accounts of the current year. Matters seemed now to be progressing more smoothly, but until some arrangement was made for co-ordinating the passenger transport of Montevideo the outlook for all who carried on the transport business there, whether by tramways or omnibuses, was precarious.

The Bagdad Light & Power Co.—Presiding at the annual meeting held on Tuesday last Sir William G. Max Muller (chairman) said that in the past year sales had shown an appreciable increase; the operating profit in 1936 was 16 per cent. higher than in 1935 and consumers connected increased by 1,749 to a total of 12,830. Considerable developments were taking place in Bagdad and the prospects for the current year were favourable, operating profits for the first four months already showing a fresh increase on those for the corresponding period last year. The installation of an additional boiler and turbo-generator set was progressing steadily and would probably be completed by the autumn. The plant capacity would thus be raised to 10,000 kW. Their plans for changing the system of supply from d.c. to a.c. were being carried out according to plan.

Petters, Ltd.—The *Financial Times* states that the new board of Petters, after an investigation of the position of the company, considers it advisable to suggest certain alterations in the company's articles of association and in the financial structure of the company. This will necessitate holding the annual meeting at a date rather later than normal. Interest on the company's 5 per cent. funding certificates will be paid on the due date, July 15th.

Bennis Combustion, Ltd., reports a net profit for the year ended April 30th of £22,386, as compared with £21,007 for the preceding twelve months. After providing £908 for income tax, it is proposed to place £4,000 to general reserve and to pay a final dividend on the ordinary shares of 5 per cent., making 10 per cent. for the year. A sum of £2,362 is applied to writing down certain special expenditure to £1, and £2,970 is carried forward (against £1,354 brought in).

City of Cape Town.—The list opened on Monday last for an issue of £1,850,0000 3½ per cent. redeemable stock, 1957, at £98 per cent. Of this £500,000 has been applied for, leaving £1,350,000 for public subscription. The object of the loan is to provide for extensions to the city's electricity undertaking. In 1930 the sales of electricity amounted to 65,170,679 kWh, with a total income of £551,042, and last year these figures had risen to 167,568,745 kWh and £735,382 respectively. The total loans raised in connection with the undertaking amount to £1,707,645, of which £11,220 has been repaid and £383,738 has been accumulated in sinking fund towards repayment of the balance outstanding. The total capital outlay on electricity works as at December 31st, 1936, was £4,362,381. Depreciation and loan revenue amounted to £1,836,793, leaving net capital expenditure of £2,525,588. The lists closed on Monday, the issue having been largely oversubscribed.

Bruce Peebles & Co.—The Edinburgh correspondent of the *Financial Times* reports that proposals to capitalise the arrears of the 7½ per cent. preference dividend were generally accepted at a recent meeting of shareholders, but the proposed cancellation of the contingent further dividend of 2½ per cent. was objected to by some of the shareholders. As a result the meetings were adjourned until July 14th when the proposals were to be formally considered. The directors still believe that their proposals taken as a whole are reasonable, but in deference to the views of those shareholders who have been consulted and as they consider it to be in the interest of the company itself, they are prepared to amend their proposals by withdrawing the cancellation of the further 2½ per cent. contingent dividend

The United Dominions Trust, Ltd., reports that the profit of the parent company for the year ended June 30th was £201,802, as compared with £178,709 for the preceding year, which with £18,199 brought in makes £220,001. General reserve receives £75,000, Dominion and Colonial development account £5,000, and pensions and staff benevolent account £12,500. The ordinary dividend for the year is 17½ per cent., and £10,064 is carried forward. The subsidiary, the United Dominions Trust (Electric), Ltd., has again paid a dividend of 10 per cent., less tax, which has been included in the profits of the parent company. During the current financial year a subsidiary company has been registered in South Africa under the name of United Dominions Corporation (South Africa), Ltd.

The Jerusalem Electric and Public Service Corporation, Ltd., reports a profit for the year ended March 31st, including £P.2,832 brought in, of £P.63,114, as compared with £P.58,415 for the previous year. The following appropriations have been made:—Provision for income-tax, £P.12,000; general reserve, £P.5,000; capital amortisation fund, £P.5,477; and plant renewal account, £P.15,400. The ordinary dividend for the year is 6 per cent. (against 5 per cent.), and £P.4,228 is carried forward. The report states that the business of the company has continued to show expansion which has necessitated the installation of further plant to deal with the growing load. Meeting: July 28th.

Cable & Wireless (Holding), Ltd.—The legal formalities in connection with the reconstruction scheme of Cable and Wireless (Holding), Ltd., have now been completed and the proposals become effective. Stockholders have been advised of the procedure to be followed for the exchange of stock certificates, which will be ready for issue on July 20th. The directors announce that the six months' interest to June 30th, at the rate of 4 per cent. per annum, less tax, will be paid on the cumulative funded income stock on July 31st.

The National Electric Construction Co. reports a total revenue of £44,006, as compared with £45,384. After deducting management expenditure, &c., and debenture interest there is a balance of £32,418. From this is deducted sinking fund premium for redemption of debentures and reserve for Dewsbury & Ossett Tramways, leaving £28,891. The dividend is maintained at 10 per cent., and £10,481 is transferred to undivided profits account.

The Wellman Smith Owen Engineering Corporation reports a net profit for the nine months to March 31st of £20,947, to which is added £4,835 brought in. A dividend of 7½ per cent. is paid and £14,125 is carried forward. The report for the eighteen months to June 30th, 1936, showed a profit of £17,940, less profit realised prior to reconstruction (£5,334), leaving £12,606. The dividend was at the rate of 5 per cent.

The Electrolytic Zinc Co. of Australasia has announced a dividend of 9 per cent. for the half-year ended June 30th on both preference and ordinary shares, plus a bonus of 6d. per £1 share. This, with the interim dividend, makes a total distribution of 17½ per cent. for the year on both classes (against 10 per cent.).

The Kalgoorlie Electric Tramways, Ltd., reports gross receipts for 1936 of £30,372, as compared with £29,072 in the preceding year. The net profit earned before charging interest on "B" debenture stock was £3,502 (against £2,493).

Edmundson's Electricity Corporation, Ltd., reports that the results of the operations of its group of companies during June as compared with the corresponding month of 1936 show an increase of 21 per cent. in kWh sold.

The Nigerian Electricity Supply Corporation is paying a dividend of 7½ per cent. on the preferred ordinary shares for the year ended February 28th (against 4½ per cent.).

Falk, Stadelmann & Co., announce a dividend of 10 per cent. actual, less tax (same) on the ordinary shares for the year ended March 31st.

Thorn Electrical Industries, Ltd., proposes to pay a dividend of 20 per cent. on the ordinary shares for the year ended March 31st last. The public issue was made on December 17th, 1936.

The North Metropolitan Electric Power Supply Co. has announced an interim dividend of 4 per cent. on the ordinary stock.

George Kent, Ltd., are paying a final dividend of 7 per cent., less tax, making 10 per cent. for the year (against 8 per cent.).

Crossley Bros. are paying a dividend of 5 per cent. (same) on the 7 per cent. preferred ordinary shares.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange markets have passed into waters more tranquil than those which disturbed the House towards the end of last month. The financial crisis which prevailed in France, and the slump which overtook markets in New York had the effect of shaking out a good deal of stock which has become placed, apparently, in stronger hands. The investor, recovering confidence, finds that quotations have advanced well above the levels which obtained lately, and that it is no longer an easy matter to pick up stocks and shares at what look to be bargain prices.

Gilt-edged Stocks

The gilt-edged market has had a better week than for some time past; with the price of War Loan up to three figures again, the list of Government stocks is beginning to look more normal. A feature and, possibly, a straw in the wind is the development of a small premium on the new L.C.C. stock which, having failed dismally to attract public subscription on the occasion of the issue a few weeks back, had been standing until a few days ago at a substantial discount. Over-subscrip-

tion of the latest issues in this market gave evidence of a reviving appetite for safety-first securities. Central Electricity Board stocks are very steady.

Cable and Wireless

Cable and Wireless stocks are now quoted as 4 per cent. income, 5½ per cent. preference, and ordinary. The income stock arises from the arrears of preference dividend which have now been distributed in the shape of stock. The 4 per cent. income, which stands first in the combine's list, is quoted at 101, while the preference, ex dividend, stands at 104¼, the ordinary being 83¼. Of the trio, the preference looks the cheapest, for unless money should become even more abundant than it is at the present time, the income stock appears to be fairly well valued at par while the ordinary is dependent, of course, for its dividend upon earnings that optimism hopes will be sufficient to provide 4 per cent. dividend on this stock. A good deal of business was transacted on Monday in this week, after which interest seemed to fall away to some extent.

Electricity Supply Shares

Helped by the half-year's figures relating to electricity output in this country, the list of electricity supply share prices has something to show this week for the better feeling which has lately returned to the market. Modest advances are recorded in a number of quotations. County of London are noticeably strong at 48s. Metropolitans put on 1s. to 46s., and North Metropolitans 9d. to 48s. 3d. Others to make headway were Scottish Power and Midland Counties at the common level of 36s. 6d. and North Easterns at 32s. Electricity Supply Corporation at 52s. and British Power and Light at 27s. 3d. are each a few pence up. Isle of Thanet had a lively recovery from 21s. to 24s. 6d. In the foreign group neither Jerusalem Electric, at 26s., nor Palestine Electric "A" shares, at 37s., were influenced to any extent by the week's events. Elsewhere, Atlas Electrics sagged to 5s. 6d. after the meeting. Among Indian issues, Calcuttas rose further to 42s. 3d., with the new shares at 21s. 6d. premium, and Cawnpores improved to 45s. 6d.

Statements as to amalgamation of the City of London and the County of London companies are incorrect, but details of a close working agreement between the two undertakings are expected to be announced shortly.

Electrical Equipment and Manufacturing

Electrical equipment shares shared with steel and engineering descriptions the lead in the past week's upward movement in industrial share prices. The view that electrical issues might be to the fore in a return of confidence to industrial markets has been repeated here more than once in recent weeks, the reason being the ample scope remaining for the industry's expansion in markets both at home and abroad. Improvement has so far been confined largely to the leading shares in the equipment group. General Electrics recovered to the £4 mark, buyers of the shares being encouraged by the tenor of the annual meeting. Cable manufacturing shares again gave a good display. Callenders advanced from 4⅞ to 4⅛, as compared with 4¼ a fortnight ago. British Insulated, at 4⅞, repeated the previous week's gain of ¼. Associated Electricals are 1s. better at 48s. Other firm spots are Automatic Telephones 44s. 9d., Ever Ready 33s. 6d., and Westinghouse Brakes 68s. 6d. Crabtrees had a jump of 2s. to 31s. 6d. Lancashire Dynamos are changing hands at around 67s. 6d. Shares to lose ground were Allen Wests, now 5s. 9d., and Ismay Industries 6s. 9d. Hall Telephones, at 25s. 3d., are quoted ex rights to the offer of new shares at 11s. The latter are quoted at a premium of 13s. 9d.

Thorn Electrical Industries

Holders of Thorn Electrical Industries ordinary shares are to receive the full 20 per cent. dividend which has just been declared in respect of the year ended in March, although the public issue was made only a month or two previously to the end of the company's financial year. Immediately after the issue in December the 5s. ordinary shares, offered at 11s. 3d., were changing hands up to 17s.. Following a rise on the dividend statement the price is now 14s. 6d., at which level the yield comes to £6 18s. per cent. The preliminary statement indicates a moderate rise in the year's profits. The 6 per cent. preference shares stand at 23s. 6d., giving a return on the money of over 5 per cent., which also looks good by comparison with other well-secured issues of the same class.

Miscellaneous Matters

London Transport "C" stock scored a recovery of 1 point to 79, but is still near the year's lowest point. Aldershot Traction moved up from 47s. 6d. to 48s. 9d., after the annual meeting, but reached later to the former level. Tillings recovered to £3. Brazilian Tractions, at 24⅜., are unaltered after an early advance. A gain of 1/16 is shown by Victoria Falls at 62s. 6d. Home railway stocks had an all-round advance on the satisfactory totals made by traffic receipts in the first half of the year; interest is the keener for the imminence of interim-dividend declarations by the main-line companies. Vickers, at 29s., were a particularly good spot in the more cheerful market for steel, engineering and kindred shares. Rubber shares are fairly firm, although without encouragement from the price of the commodity.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. Previous.	Dividend. Last.	Price. July 13	Rise or Fall.	Yield. p.c. £ s. d
Bournemouth and Poole	1	15	15	67/6	—	4 9 6
City of London	1	7½	7½	33/–	—	4 11 6
Clyde Valley	1	7	8	39/–	—	4 2 1
County of London	1	10½	10½	48/–	+1/6	4 7 6
Edmundson's 7% Pref.	1	7	7	33/6	—	4 3 7
Do. Ord.	1	8	9	40/–	—	4 10 0
Elec. Dis. Yorkshire	1	9	9	41/6	—	4 6 10
Elec. Fin. and Securities	1	12½	12½	2⅝	—	4 13 0
Elec. Supply Corporation	1	11	12	52/–	+9d.	4 12 8
Lancs Light and Power	1	7½	7½	33/6	—	4 9 7
Lond. Assoc. Electric	1	—	7	31/3	—	4 9 6
London Electric	1	7	8	35/6	—	4 10 2
London Power Deb. Red.	Stock	5	5	106½	—	4 14 0
Metropolitan	1	10	10	46/–	+1/–	4 7 0
Midland Counties	1	7½	8	36/6	+6d.	4 7 8
Mid. Elec. Power	1	8	9	2	—	4 10 0
North Eastern Electric Ordinary	1	6	7	32/–	+6d.	4 7 6
Do. 7% Pref.	1	7	7	34/6	—	4 1 2
Northampton	1	10	10	45/–	—	4 9 0
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	48/3	+9d.	4 3 2
Do. do. 6% Pref.	1	6	6	30/6	—	3 18 8
Scottish Power	1	8	8	36/6	+6d.	4 7 8
South London	1	7	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/–	—	6 16 4
Yorkshire Elec.	1	8	8	39/–	—	4 2 1

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	114	—	4 7 9
Do. 1955–75	,,	5	5	115½	—	4 6 7
Do. 1951–73	,,	4½	4½	109	—	4 2 7
Do. 1963–93	,,	—	3½	97½	—	3 11 10
London Elec. Trans. Gtd.	,,	—	2½	87½	–½	2 17 1
London & Home Counties, 1955–75	,,	4½	4½	109	—	4 2 7
London Passenger Transport, A.	,,	—	4½	116½	—	3 17 8
Do. do. B.	,,	—	5	117½	—	4 5 1
Do. do. C.	,,	4	4	79	+1	5 1 3
West Midlands Joint Elec. 1948–68	,,	—	5	111½	—	4 9 8

TELEGRAPH AND TELEPHONE.

American Tel. & Tel.	$160	9	9	170½	+3	5 5 6
Anglo-Am. Tel. Pref.	Stock	6	6	125	—	4 16 0
Do. Def.	,,	1½	1½	29½	—	5 1 8
Cable & Wireless 5½% Pref.	,,	4½	5½	104½xd.	—	5 5 3
Do. Ord.	,,	—	—	83½	—	—
Do. Income	,,	—	—	101	—	3 19 3
Globe Tel. & Tel. Ord.	10	4½*	5½*	15⅝	—	3 9 10
Do. do. Pref.	10	6	6	14	—	4 5 9
Great Northern Tel.	10	20	20	41½	—	4 16 5
Marconi-Marine	1	10	7½	1⅝	—	4 5 9
Oriental Telephone Ord.	1	12*	12*	3½	—	3 16 10

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	5/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	21½	—	—
British Electric Traction Def. Ord.	,,	5	5	1275	—	—
Do. do. Pref. Ord.	,,	8	8	165	—	4 15 5
Brazil Traction	$100	40 cts.	50 cts.	24⅜	—	—
Brit. Columbia Elec. Rly. Pfd.	Stock	5	5	105½	—	4 14 9
Mexican Light Common	$100	Nil	Nil	2	—	—
Do. 1st Bonds	$500	5	5	44½	—	—
Victoria Falls Ord.	1	20	12	62/6	+1/16	3 17 0
West Riding	1	6½	10	45/–	—	4 9 0

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	15	15	2½	—	6 0 0
Assoc. Elec. Ord.	1	8	10	48/–	+1/–	4 3 4
Do. Pref.	1	8	8	37/6	—	4 5 8
Babcock & Wilcox	1	8	10	48/9	—	4 2 0
British Aluminium Ord.	1	7½	10	50/6	+6d.	3 19 3
British Insulated Ord.	Stock	20	20	4⅞	+⅛	4 2 2
Brush Ord.	Stock	Nil	Nil	49½	—	—
Callender's	1	15	15	4⅛	+¼	3 2 3
Do. 6½% Pref.	1	6½	6½	30/–	—	4 6 8
Crompton Parkinson Ord.	5/–	12½	12½	57/6	—	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	7	10	37/6	—	5 6 8
Enfield Cable Ord.	1	25	25	5½	—	4 8 0
English Electric	1	Nil	Nil	33/–	—	—
Do. do. Pref.	1	6½	6½	26/–	—	5 8 4
Ericsson Tel.	5/–	20	25	2⅜	—	2 12 8
Ever Ready	5/–	35	45	33/6	+6d.	6 12 6
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	15	17½	80/–	+1/6	4 7 6
Henley's	5/–	30	15	19/3	—	3 17 10
Do. 4½% Pref.	1	4½	4½	1⅛	—	4 0 0
India-Rubber Pref.	1	5½	5½	22/6	—	4 17 9
Johnson & Phillips	1	7½	10	41/3	—	4 16 10
Lancashire Dynamo	1	10	20	3⅜	+1/8	5 18 4
Siemens Ord.	1	6	7½	32/6	—	4 12 4
Telegraph Construction	£1	Nil	7½	2⅛	—	3 8 8

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1935

23753. "Welding electrodes." T. Bolton & Sons, Ltd., and W. E. Alkins. September 9th, 1935. (467259.)

25140. "High-frequency electric signalling systems." Ferranti, Ltd., M. K. Taylor and S. Atkinson. September 10th, 1935. (467332.)

28511. "Thermionic valve modulators or amplifiers." J. Hardwick and E. L. C. White. October 15th, 1935. (467335.)

30991. "Reduction of interference in electric signal transmission systems." W. S. Percival. November 8th, 1935. (467263.)

31041. "Electro-magnetic apparatus especially for cleaning, painting and otherwise treating submerged parts of metal vessels." G. K. Kyriakopoulos and A. G. Chryssochoides. November 10th, 1934. (467264.)

31460. "Devices for interrupting electric current." S. Ruppel. November 13th, 1935. (467496.)

31540. "Wall boxes for electric switches or other apparatus." E. Dobson, and Foster Engineering Co., Ltd. November 14th, 1935. (467266.)

31593. "High-frequency electric cable." Telegraph Construction & Maintenance Co., Ltd., and E. W. Smith. November 14th, 1935. (467268.)

34336. "Distortion indicators for electrical amplifying systems." Rediffusion, Ltd., and P. Adorjan. December 11th, 1935. (467412.)

34350. "Electro-magnetically operated gas valves." B. G. Horstmann and Horstmann Gear Co., Ltd. December 11th, 1935. (467340.)

34544. "Joint or terminal for electric cables." Callender's Cable & Construction Co., Ltd., and G. M. Hamilton. December 12th, 1935. (467417.)

34634. "Apparatus for treatment by means of high-frequency electro-magnetic waves." Standard Telephones & Cables, Ltd., and B. J. Axten. December 13th, 1935. (467502.)

34814. "Electrically operated race-game apparatus.' T. G. Jackson. December 16th, 1935. (Cognate application, 2796/36.) (467421.)

34854. "Electric current convertors." General Electric Co., Ltd., and W. G. Thompson. December 16th, 1935. (467570.)

34865. "Manufacture and production of cores for electro-magnets and the like, made from powdered materials." G. W. Johnson (I. G. Farbenindustrie Akt.-Ges.) December 16th, 1935. (467572.)

34882. "Thermionic amplifiers." Marconi's Wireless Telegraph Co., Ltd., and N. M. Rust. December 16th, 1935. (467430.)

34883. "Thermionic valves." Marconi's Wireless Telegraph Co., Ltd., N. M. Rust and G. F. Brett. December 16th, 1935. (Cognate application 34885/35.) (467573.)

34884. "Modulated carrier-wave receivers." Marconi's Wireless Telegraph Co., Ltd., and C. P. Beanland. December 16th, 1935. (467431.)

34893. "Electric-discharge devices." British Thomson-Houston Co., Ltd., W. Rule, C. E. Fenwick and W. J. Scott. December 16th, 1935. (467432.)

34903. "Telephone headbands and headsets." Standard Telephones & Cables, Ltd., and J. S. P. Roberton. December 16th, 1935. (467435.)

34911. "Band resistances for continuously regulating heavy currents." Akt.-Ges. Brown, Boveri & Cie. December 19th. 1934. (467574.)

34917. "Contacts of electric switches." V. Dumert, H. C. Hebard, H. Greenwood and Aladdin Radio Patents, Ltd. December 16th, 1935. (467437.)

34929. "Electrical indicators or measuring instruments." H. E. Gauss. December 16th, 1935. (467441.)

34932. "Telephone or like systems." Automatic Electric Co., Ltd., W. Saville and A. H. Williams. December 16th, 1935. (467442.)

34938. "Electric condensers." Steatit-Magnesia Akt.-Ges. December 14th, 1934. (467443.)

35001. "Multiple-filament electric lamps." L. C. Edwards. December 17th, 1935. (467271.)

35012. "Systems for signalling over electric supply networks." Automatic Electric Co., Ltd., and P. N. Roseby. December 17th, 1935. (467511.)

35017. "Governing mechanisms for turbo-alternators." British Thomson-Houston Co., Ltd., and R. H. Collingham. December 17th, 1935. (467512.)

35214. "Loudspeakers or the like." W. Ditsche. December 19th, 1934. (467516.)

35292. "Electric traction braking-equipment." W. S. Graff-Baker and London Passenger Transport Board. December 20th, 1935. (467642.)

35325. "Electric remote position-indicating apparatus." Elliott Bros. (London), Ltd., and H. D. Hawkes. December 20th, 1935. (467596.)

35376. "Protective devices for oil-filled electrical apparatus." J. T. Shevlin (Siemens-Schuckertwerke Akt.-Ges.). December 20th, 1935. (467272.)

35393. "Magnetron circuit arrangements." Telefunken Ges. für Drahtlose Telegraphie. December 20th, 1934. (467601.)

35421. "Electric cables." A. W. Williams. December 21st, 1935. (467612.)

35469. "Electric condensers." Dubilier Condenser Co. (1925), Ltd. (J. Katzman). December 21st, 1935. (467608.)

35577. "Cathode-ray tubes and apparatus comprising them." General Electric Co., Ltd., and L. C. Jesty. December 23rd, 1935. (467611.)

35700. "Anti-vibration mountings for electric-light fittings." S. L. M. Barlow. December 24th, 1935. (467649.)

35749. "Electric switchgear." British Thomson-Houston Co., Ltd., H. E. Cox and E. D. Regis. December 24th, 1935. (467616.)

36022. "Dynamo-electric machines with swash-ring drive." H. H. Stinnes. January 4th, 1935. (467277.)

36124. "Electro-magnetically operated valves." A. J. Thorneloe. December 31st, 1935. (467519.)

1936

689. "Electrical controlling means for lifts." Express Lift Co., Ltd., and R. J. Stevens. January 8th, 1936. (467348.)

718. "Fluxes and flux-coated electrodes for electric welding." T. C. R. Shepherd and Metropolitan-Vickers Electrical Co., Ltd. January 8th, 1936. (467450.)

1667. "Short-wave adaptor for superheterodyne wireless receivers." T. A. Biddington and R. Pearl. January 18th, 1936. (467284.)

3622. "Television apparatus." E. Michaelis (E. Kinne). February 6th, 1936. (467286.)

5478. "Road contact devices for road-traffic signalling apparatus." W. H. Scott. February 24th, 1936. (Addition to 419533.) (467354.)

7627. "Cathode-ray tubes." General Electric Co., Ltd., and A. L. Reimann. March 13th, 1936. (467293.)

9131. "Cooling of dynamo-electric machines." Mather & Platt, Ltd., and E. E. Watson. March 27th, 1936. (467527.)

9332. "Electric forging or upsetting machines." Austin Motor Co., Ltd., H. W. Walker and P. J. Blundell. March 30th, 1936. (467360.)

10341. "Electrical flame-producer." P. S. Rao. April 23rd, 1935. (467363.)

11621. "Electric-discharge devices." General Electric Co., Ltd., and L. C. Jesty. April 23rd, 1936. (467296.)

12397. "Cathode-ray tubes containing incandescent screens." Farnsworth Television, Inc. May 7th, 1935. (467366.)

12398. "Means and methods of producing incandescent images in cathode-ray tubes." Farnsworth Television, Inc. May 7th, 1935. (467367.)

13305. "Controllers for electric circuits." Weston Electrical Instrument Corporation. March 28th, 1936. (467297.)

19606. "Electric oscillatory circuits." N. P. R. Jarnak. July 22nd, 1935. (467535.)

22977. "Telephone installations." Telefonbau und Normalzeit Akt.-Ges. February 12th, 1936. (467385.)

25154. "Control of alternating-current circuits by saturable chokes." J. Pintsch Akt.-Ges. September 21st, 1935. (Cognate applications 25155/36.) (467628.)

27438. "Microphones." Electrical Research Products, Inc. July 28th, 1936. (467311.)

27495. "Process and apparatus for producing electrodes for electric arc-welding." J. Lenoir. October 10th, 1935. (467395.)

30387. "Snap-action electric switches." A. H. F. Perl. December 13th, 1935. (467652.)

30591. "Welding wires or electrodes." Bohler & Co., Akt.-Ges., Geb. November 9th, 1935. (467317.)

30797. "Electro-magnetic switches." British Thomson-Houston Co., Ltd. November 13th, 1935. (467464.)

31450. "Converter spark-gap systems." Electric Furnace Co., Ltd. January 2nd, 1936. (467545.)

32412. "Radiogoniometers." Soc. Des Etablissements H. Lepaute. November 26th, 1935. (467547.)

32422. "Electric plug-connectors for electrically heated smoothing irons." A. Bockler. November 26th, 1936. (467548.)

32561. "Telephone or like systems." Automatic Electric Co., Ltd. W. Saville and A. H. Williams. December 16th, 1935. (Divided out of 34932/35.) (467467.)

32830. "Sealing or joint-making insertion." Felten & Guilleaume Carlswerk Akt.-Ges. November 29th, 1935. (Cognate application 32831/36.) (467468.)

35248. "Production of electrodes for electric accumulators." Chloride Electrical Storage Co., Ltd. (Accumulatoren-Fabrik Akt.-Ges.). December 23rd, 1936. (467475.)

1937

208. "Methods of electric welding." British Thomson-Houston Co., Ltd. January 2nd, 1936. (467323.)

2528. "Electron-optical image-converter." British Thomson-Houston Co., Ltd. January 28th, 1936. (467556.)

3137. "Starting-switches for use in connection with electric motors." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. January 3rd, 1936. (Divided out of 225/36.) (467634.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 7th:—

Condair. No. 577498. Class 6. Engines for air-conditioning plant. No. 576910. Class 18. Air-conditioning plant.—Fractional H.P. Motors, Ltd., West Heath Works, Rookery Way, Hendon, N.W.9.

British Pyramid Battery (lettering and design). No. 577011. Class 8. Electric batteries and accumulators (not for medical purposes).—Douglas S. Barton, trading as the Humber Oil Co., 71, Bricknell Avenue, Hull.

AIC (lettering and design). No. 574605. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Unicam Instruments, Ltd., Arbury Road, Cambridge.

Orsatmat. No. 577318. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—The Hays Corporation, Michigan City, Ind., U.S.A. (British representatives, Rosling Morgan Hughes, 72-74, Cannon Street, E.C.4.)

Romac. No. 577329. Class 11. Instruments, apparatus, and contrivances (not medicated) for surgical or curative purposes or in relation to the health of men or animals.—Romac Motor Accessories, Ltd., Romac Works, The Hyde, Hendon, N.W.9.

Electromatic. No. 576253. Class 18. Installations, being plant, for conditioning and dispensing beer.—K. A. Bownass and A. G. T. Cole, trading as Electromatic Bar Installations, Midland Bank Chambers, Bowness-on-Windermere.

Beetalite. No. 577063. Class 50. Slabs, sheets and veneers made principally of synthetic resin and articles made therefrom. The Streetly Manufacturing Co., Ltd., Ideal House, 1, Argyll Street, W.1.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Basingstoke.—Houses (22), North Waltham and Bramley; Wallis & Smith, architects, 8, Cross Street, Basingstoke.

Beckenham.—Extensions to electricity works, Churchfields Road; P. Parr, borough surveyor, Town Hall.

Becontree.—Houses (78), Barking (Section 17), for L.C.C. (£54,931); M. J. Gleeson, Ltd., builders, North Cheam, Surrey.

Bedworth.—Houses (100), Wootton Street, Marston Lane; U.D.C. surveyor, Council Offices, High Street.

Beverley.—Houses (40), Mill Lane; Whiteing & Reynolds, architects, 3, Ladygate.

Birmingham.—Houses (36), Shaftesmoor estate; Stubbins & Co., builders, Erdington.

Blackpool.—Factory, Stanmore Avenue; W. G. Ellis. Council offices and shops, next to the Town Hall (£67,252); borough engineer.

Brighouse.—Houses (50) and construction of roads, &c., near Smith House Lane, Bailiff Bridge; Spencer and Sharp, architects, 654, Great Horton Road, Bradford.

Brighton.—Electrical treatment and massage dept. for the Royal Sussex County Hospital; F. T. Wilson & Sons, builders, St. James's Street.

Bristol.—Houses (28), Speedwell Road and Clare Road; H. M. Webb, surveyor, 51, Prince Street. Factory for English Corrugated Paper Co., Ltd., St. Paul's.

Bromsgrove.—Extensions to hospital (£40,000) with electrical work; S. N. Cooke, architect, Sun Buildings, Bennett's Hill, Birmingham.

Burton-on-Trent.—Extension to Town Hall (£40,000); borough surveyor.

Cardiff.—Car park and air raid shelter under Central Gardens (£125,000); city engineer.

Chesterfield.—Houses (26), Hucknall Avenue, F. Longden. Houses (37), New Whittington estate (£15,045); A. Heath.

Chorley.—Cinema, Market Street, for the Odeon Theatres, Ltd.; Sir R. McAlpine, Ltd., builders, Exchange Buildings, Manchester.

Colchester.—Houses (47), Harwich Road and Old Heath site (£14,472); borough surveyor.

Coventry.—Shops, offices and flats, Corporation Street; W. Moss & Sons, Ltd., builders, Queen's Road, Loughborough.

Dagenham.—Extensions to works, for Lewis Berger & Sons.

Denton.—Houses (108), Tame Street; U.D.C. surveyor, Town Hall.

Dowlais.—Factory for the Hall Telephone & Manufacturing Co., Willesden, London, N.W.10.

Dudley.—Shops, Stone Street; borough engineer.

Enfield.—Houses (78), Addison estate; Swannell & Sly, architects. Factory, Lockfield Avenue; P. Bilton (Properties), Ltd. School, Bell Lane, Enfield Wash, for E.C.; F. Lee, architect, 7, Little Park Gardens, Enfield.

Essex.—School, Aveley, for County E.C.; J. Stuart, county architect, County Hall, Chelmsford.

Exmouth.—Houses (100), Withycombe, Raleigh; Ellis & Son, architects, Station Parade, Exmouth.

Gloucestershire.—School, Patchway, and technical college, Cheltenham, for C.C.

Great Ayton (YORKSHIRE).—Extensions to Friends' school; D. Oakley, builder, Roman Road, Northallerton.

Great Crosby.—Cinema (£50,000) fronting on Coronation Road and Islington Road, for W. Alexandre Wallace, Argyle Street, Birkenhead.

Hastings.—Houses (28), near Frederick Road; Jeffery & Wyatt.

Haswell (Co. DURHAM).—Houses (105), for the North-Eastern Housing Association, Newcastle-on-Tyne; Marshall, Tweedy & Bourn, architects, 129, Pilgrim Street, Newcastle-on-Tyne.

Hatfield.—Houses (20), Welham Green, North Mimms; J. R. Howarth, surveyor, Council Offices, St. Albans Road, Hatfield.

Haverfordwest.—Houses (30); H. W. D. Williams, town clerk, 12, High Street.

Hebburn-on-Tyne.—Drapery stores in the New Town, for the Jarrow and Hebburn Co-operative Society; G. C. Young, architect, 12, Grange Road West, Jarrow-on-Tyne.

Hinckley.—Factory for the Burgess Products Co., Ltd., Barwell; A. Herbert, architect, 18, Priory Lane, Leicester.

Houghton-le-Spring.—Houses (77); U.D.C. surveyor.

Ilkeston.—Cinema and shops, South Street; Ilkeston Ritz, Ltd. Isolation hospital; E. G. Phillips, consulting engineer, Nottingham.

Ipswich.—Terminal buildings to the Municipal Airport, Nacton Road; E. McLauchlan, borough surveyor, Town Hall.

Irish Free State.—(CLONMEL, Co. TIPPERARY).—Houses (47), surveyor, Town Hall, Clonmel. (ENNISCORTHY, Co. WEXFORD).—Houses (22); G. Flood, engineer, Town Clerk's Office, Enniscorthy.

Isle of Axholme.—Houses, Belton, Westwoodside, Owston Ferry and Crowle; R.D.C. surveyor, Council offices, Epworth.

Knaresborough.—Houses; A. E. W. Lupton, U.D.C. surveyor, 14, Bower Road, Harrowgate.

Lancashire.—School, Droylesden, Manchester, for County E.C.; H. S. Fairhurst and Sons, Chancery Buildings, 55, Brown Street. School, Tottington, Bolton, for County E.C.; Adshead, Topham and Adshead, 14, Ridgefield, Manchester, 2.

Lancaster.—Houses, Ingleborough Road and Whernside Road; Fairhope Estates, Ltd. School, adjoining Torrisholme Road (£18,700), for E.C.; city surveyor.

Leeds.—Houses (1,192) and flats, Halton Moor estate; housing director. Six-storey building, Headrow, consisting of a cinema, garage, offices and shops (£250,000); Kitson, Parish, Ledgard and Pyman, architects, Vicar Lane, Leeds. Extensions to St. James's Hospital (£61,650); city architect.

Leicester.—Factory for M. A. McEvoy, Ltd., Leaper Street, Derby. Infants' department at Caldecote Road Council school (£23,662), and school, Checketts Road, Belgrave, for City Council; city engineer. Schools, Fosse and Haddenham Roads, for E.C.

Lichfield.—Houses (58), Boney Hay estate (£18,136), with electrical work; Swingewood, Shaw & Lymer, builders, Lichfield.

Liverpool.—Block of shops and offices, 15-29, Lord Street; Hillier, Parker, May & Rowden, architects, surveyors, Maddox Street, London, W.1.

London.—(HOLBORN).—Rebuilding City Literary Institute (£55,755); Halse & Sons, Ltd., 5, Chapel Street, S.E.18. Cinema, on site of Daly's Theatre, Leicester Square, for Warner Bros., Pictures, Ltd., 135, Wardour Street, W.1.

Luton.—Houses (50), Eaton Green estate, Hyde; H. C. Janes, Ltd.

Northampton.—Houses (23), Malcolm Drive; Chowns, Ltd. Cinema, Welford Road, for Harris & Faulkner; Underwood & Weston, builders, Lady's Walk, Northampton. Printing works, Bedford Road; Creative Printers, Ltd.

Northamptonshire.—Reconstruction of buildings for senior school (£11,500) for County E.C., County Hall, Northampton. County offices, Guildhall Road, Northampton; county architect.

Northumberland.—Remodelling of the Radcliffe Council school, Belsay, and school, Kieker, for C.C.; county architect, County Hall, Newcastle-on-Tyne.

Norwich.—Modernisation of the Norwich Hippodrome (£20,000), for B. & J. Theatres, Ltd., 19, Charing Cross Road, London, W.C.2.

Nottingham.—School, Retford; S. Allan, architect.

Nuneaton.—School, Greenwood Road; H. N. Jepson, architect, Midland Bank Chambers.

Oldbury.—Houses (28), Barston Road; C. Nokes & Son. Houses (68), Leahouse Farm estate; Mr. Mucklow. Houses (206), Moat Farm estate; borough engineer. Ten shops, Bleakhouse Road; R. Perkins (Smethwick), Ltd. Extensions to works, Simpson Street; Midland Printing Co., Ltd.

Orpington.—Houses (30), Sevenoaks Road, Green Street Green; M. J. Gleeson, Ltd., builders, London Road, North Cheam, Surrey.

Portsmouth.—Extensions to St. Thomas's Cathedral (part 2); Walden & Son (Henley), Ltd., builders, Henley-on-Thames.

Rugby.—Houses (80), Parkfield Road, Newbold; borough surveyor, The Lawn, Newbold Road, Rugby.

Rugeley (STAFFORDSHIRE).—Senior boys' and girls' school (£33,378), with electrical work; Green & Bird, builders, Hednesford.

Scarborough.—Café and bakery, Eastborough, for E. Durant; Watson & Ritson, architects, City Chambers, Savile Street, Hull.

Shetland.—Hostel, Anderson Educational Institute, Lerwick (£25,000); clerk, Education Committee, Lerwick.

Southall.—Offices, Windmill Lane; Metropolitan Electric Supply Co., Ltd. Extensions to works, Hanson Gardens; B. Attewell & Sons.

South Shields.—School, Prince Edward Road, for E.C.

Sowerby Bridge.—Houses and bungalows, Beechwood estate; J. Normanton, surveyor, Council Offices, Sowerby Bridge.

Stalybridge.—Houses (164), Brushes estate (£56,304); J. Ridyard & Sons, Ltd.

Stanley (LEEDS).—Houses (50), Moor House estate; U.D.C. surveyor.

Stockport.—Cinema, assembly hall, &c., at the junction of Manchester Road and Denby Lane, for Empress (Heaton Norris), Ltd.

Stourbridge. — Swimming baths improvement scheme (£20,000); borough surveyor.

Stretford.—Houses (206), Barton Road estate (£69,372); J. C. Jeffries.

Sunderland.—Shops and offices, High Street, for the Town Tailors, Ltd.; G. Henderson, builder, Boldon Lane, East Boldon.

Surrey.—Hospital, St. Helier estate, Morden (£631,575), for C.C.; Allen Fairhead & Sons, Ltd. Alterations to Central school, Lingfield (£14,005), and enlargement to County Girls' school, Richmond (£16,802), for County E.C.

Tadcaster.—Cinema, Westgate, for Hartley & Sons, Ltd.; Brayshaw Bros., Ltd., builders, Tadcaster.

Thurrock (ESSEX).—Factory, West Thurrock, for Thomas Hedley & Co., Manchester.

Torquay.—Cinema, Albert Road; Morris Syndicate.

Wakefield.—Works and offices, Thornhill Road; Drake & Warters.

Wallsend-on-Tyne.—Houses (400); North-Eastern Housing Association, Northumberland Road, Newcastle-on-Tyne. Factory, for Hood Haggie & Sons, Ltd.; Wilson & Wilson, architects, St. Nicholas Buildings, Newcastle-on-Tyne. Cinema, High Street; T. Pailor. Tuberculosis centre, The Green; county architect.

Walsall.—Block of shops and flats, Bridge Street, for Kilby & Tibbetts, Tudor House, Bridge Street; E. G. Lester, builders, Stafford. Factories, Long Acre, for John Wheway & Son, and Wednesbury Road, for the Walsall Lythographic Co., Ltd.; W. Kendrick & Son, builders, Tasker Street.

Watford.—Houses (117) and flats, Briar Road; Hillingdon Estate Co. Houses (28), Tudor Walk: Mulcrece Estates, Ltd. Cinema, St. Albans Road; J. Owen Bond & Sons. Factory, Cassiobury Mills, St. Albans Road; Fishburn Printing Ink Co., Ltd. Seven shops and flats, St. Albans Road; L. S. Marler.

West Bromwich.—Bus depot (£41,373); borough engineer.

West Hartlepool.—Houses and shops, Stockton Road and Dyke House Farm estate; borough engineer.

Winchester.—Houses (46), Highcliffe Park (£20,341); H. Miller & Co., builders, Cobham.

York.—Houses (24), Upper Poppleton, for Great Ouseburn R.D.C.; Ward & Leckenby, architects, Museum Street, York.